

EXCAVATIONS AT AOTEA, WAIKATO, 1972-75

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Abstract. The excavation of four prehistoric terrace sites on the Waikato coast, near Aotea Harbour, is described. The settlement dates to the late fifteenth or early sixteenth century A.D. The excavations shed light on the nature of undefended terrace settlements. Features identified include a sleeping house, a cooking shed, working areas and a variety of storage pits. An economic analysis shows the importance of stored horticultural produce and the lesser importance of shellfish and fish.

The excavations at Aotea were undertaken by Richard Cassels as part of an ambitious scheme for a complete survey of the prehistoric Maori occupation of the west coast between Aotea and Raglan harbours (Fig. 1). It was designed to complement a previous survey of the inland region of the upper Waikato basin (Cassels 1972a, b) and to discover any significant differences in the settlement patterns in the two areas which are separated by the Pirongia Range. In the summer of 1971-2, some 100 sites on map N64 were recorded and incorporated in the New Zealand Archaeological Association's file at the Waikato Museum (Cassels 1972c). The remarkable concentration of midden and other sites at Aotea North Head (Fig. 2), close to the large elaborate Manuaitu pa and its associated sacred *tuahu* stones (N64/97) indicated that further investigation of a limited area here would be profitable. Accordingly in 1972-3 a small-scale excavation of a terraced site (N64/25) was undertaken, together with a sampling of over 100 shell middens exposed in the dunes.

The results of the midden analysis were presented to the IXth I.N.Q.U.A. congress at Christchurch as 'Patterns of prehistoric resource exploitation at Aotea' (Cassels 1973) but the report of the terraced settlement was deferred, pending some investigation of an associated field system and borrow pits (Walton MS) and the planning of Manuaitu pa (Fox 1976: fig. 37). Cassels found himself unable to complete the report and when leaving Auckland in 1982, suggested to Aileen Fox that she should. The report which follows is limited in scope; although essentially a joint work, responsibility for different sections has been indicated by the author's initials.

THE SETTING

The north head of Aotea Harbour is the tip of a long peninsula extending for some 8 km along the west coast as far as the Toreparu Stream. The dominant feature of the relief is the 152 m (500 ft) high bluff of Manuaitu pa built on an old basaltic dome, a formation which continues south-west towards the coast at Taranaki Point (Fig.2). South of Manuaitu, the ground slopes gently down towards the Head until it meets with the line of massive sand dunes rising to 91 m (300 ft).

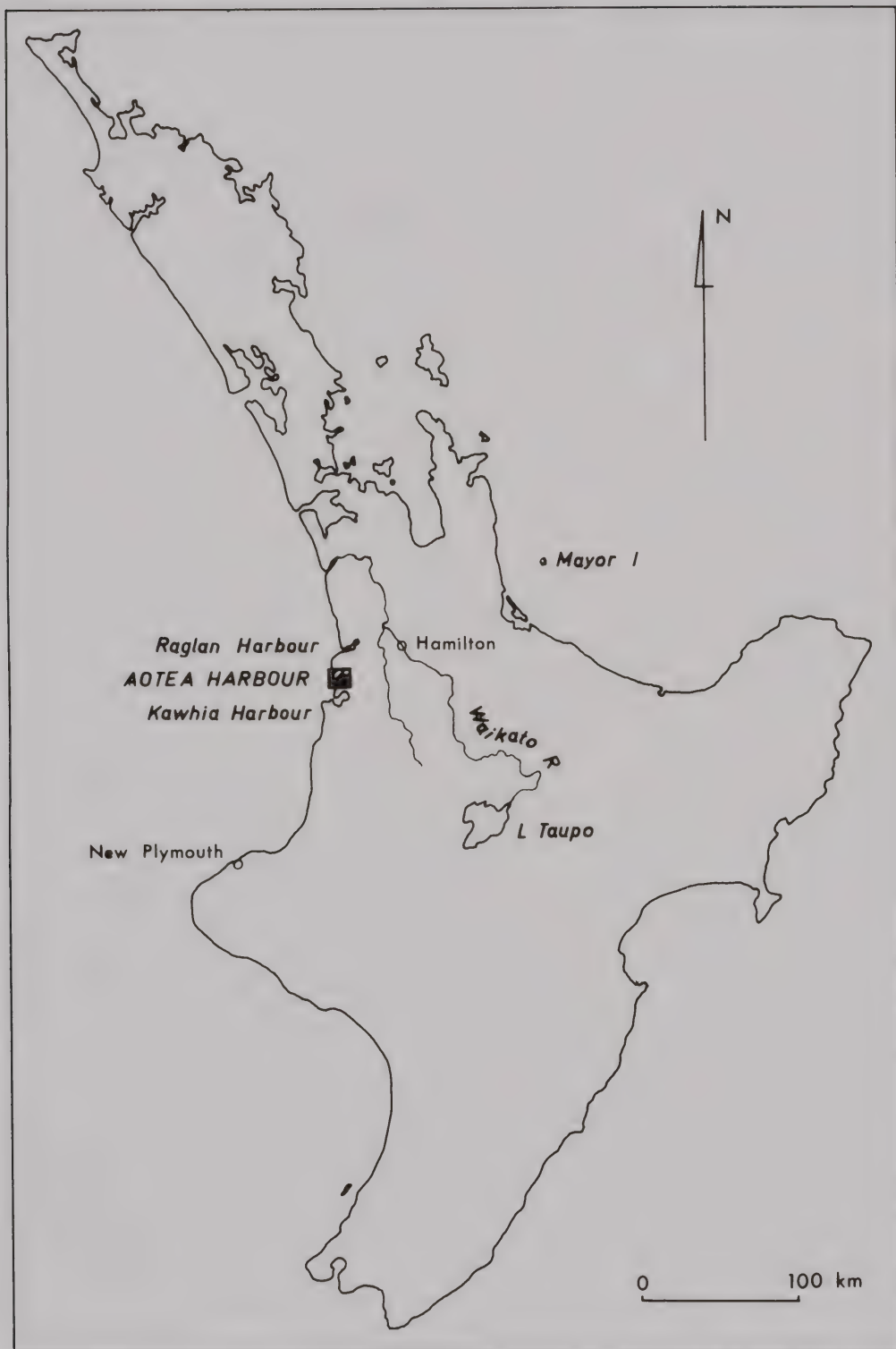


Fig. 1. Location map.



Fig. 2. Distribution of sites, Aotea North Head. For location see Fig. 1.

Geologically the area is complex: the higher ground to the north is basically Jurassic greywackes and argillites with a Tertiary cover of marine deposits of limestones and sandstones, visible in the cliffs of Raglan Harbour and about Taranaki Point, but mainly eroded elsewhere. Late Pliocene eruptions produced the basalts and andesites of Mount Karioi (716 m, 2350 ft) together with the Manuaitu dome which were subsequently mantled by Quaternary deposits of the Kaihu group, made up of andesitic tephra (Pain 1976: 158 and fig. 1). Aotea Harbour filled "a depression formed during the Miocene movements by west trending faults and associated down scarps" (ibid:155). The Head itself was built up by a marine supply of sediments of late Quaternary age consisting of wind blown (Aeolian) sands interbedded with water-laid sediments which have become consolidated to varying degrees (ibid:169). The loose surface sands are still moving north and eastwards, driven by the prevailing south-west winds and have engulfed remains of Maori occupation, including Kororomaiwaho pa (N64/8). The variety of the geological formations provided some advantages for early Maori settlers and is reflected in the stone artefacts found during the excavations (see Catalogue, Figs. 17-23).

A few small streams flow west in steep-sided valleys to the Tasman beaches, and others flow east through lowland and swamp to the shallows of the harbour. There are also small pools of freshwater formed where the dunes have built up across former drainage lines (Pain 1976:171).

The natural undisturbed soil in the tract of land between Manuaitu and the dunes where the excavations took place, is "a firm bright reddish-brown ash", an andesite tephra, covered by 5-10 cm of dark brown friable sandy loam with a weak to moderate crumb structure, the product of ancient weathering sand accretions. Walton's work (Walton MS) has shown that beneath the present turf line, the top soils were improved and deepened for Maori cultivation by the addition of fine sands dug from below the ash in numerous 'borrow pits'. Today the area is reclaimed grassland, providing a windswept pasture that is almost treeless. Scrubby growth and an occasional pohutukawa survive in the Te Puata and other small valleys, whilst a patch of scrub (now removed) close to the excavation in 1973 consisted of *Senecio* spp., *Cyathodes* and *Coprosma*. Examination of the charcoals from the excavation (Appendix 4, below) showed that there were some forest trees, tawa and rimu (11%), as well as kanuka (16%) growing in the vicinity in the late 15th and 16th century, the remainder being from shrubby growth, mainly *Hebe* sp. (23%) and *Coprosma* (7.6%). Pohutukawa was represented only in a sample from the topsoil near the site. The Maori need for house timbers, for palisades, and for firewood, as well as land clearance for cultivations, will have undoubtedly contributed to the loss of the coast forest formerly existing in this area.

Other natural resources available to early settlers in the area were the extensive beds of shellfish; at the present time there are tuatua and mussels on the Tasman coast, pipi in the sands of the harbour entrance, and cockles throughout the harbour (Cassels 1973:fig. 1). Excavation showed that all these were exploited by the Maori population. Eels would be obtainable from the streams to the harbour as well as from the Toreparu and Ruapuke streams.

SITE DESCRIPTION, N64/25 (Fig. 3)

The site chosen for excavation was a group of terraces on the south-facing slopes of a shallow dry valley and about 200 m inland from the present cliff top, which is slowly being eroded. There is another similar valley lying parallel to the south, beyond which is the present edge of the high sand dunes, about 150-200 m distant from the excavated site. The valley was selected because it was one of the few with terraced settlements surviving in the area (Fig. 2) which had not been heavily ploughed and because there were signs of cultivations as well as 'borrow pits' near by. Shell midden indicative of occupation was exposed on the outer edge of some terraces and there were surface indications of storage pits. The intention was to look for houses and other domestic structures since apart from the swamp site of Mangakaware (Bellwood 1978) none were then known in the Waikato; and in view of its potential to examine fully the economic basis of the settlement. The association of shell midden, storage pits, and possible house sites seemed to have considerable potential for a quantitative study of diet.

The visible remains of the settlement consist of some 20 terraces spread out over a kilometre of the landscape and sited from top to bottom of a gentle slope, 10 m high. The relief is slight and individual features are difficult to discern when the grass is growing strongly. The terraces tend to occur in groups with one large one 20-30 m long associated with two or three smaller ones, for example the excavated sites A1-2, and A4 (Fig. 3). To the west end of the site nearing the cliff edge, which is 70 m above sea level, there is a flat area 40 x 75 m without signs of occupation; three rectangular storage pits are visible on a large terrace below the flat, and three more on the slopes above it, measuring 6 x 3, 3 x 2 and 3 x 3 m which are not marked on Fig. 3. The top of the bell-shaped *rua* pit was visible on the highest terrace at the east end of the site, and another on the adjacent terrace (A6) which was excavated (Fig. 12, Pit 10).

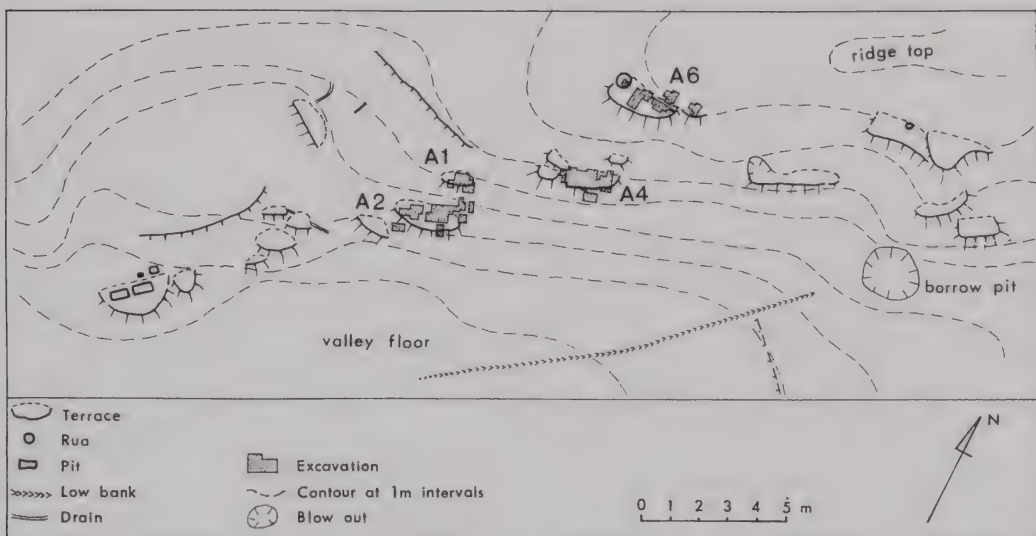


Fig. 3. N64/25. Plan of terraced settlement.

Across the valley floor there is a low transverse bank and an associated lynchet scarp at right angles to it, indicative of ancient cultivation. There is one large 'borrow pit', a circular quarry about 2 m deep, and another much smaller hole of similar character at the end of an adjacent terrace. Walton's work on similar features to the north-east (see Figs. 15-16) is summarised below.

THE EXCAVATIONS

Four terraces (A1,2,4,6) were selected for excavation, spread in a diagonal line one above the other up the valley side (Fig. 3). These will be described in numerical order. Each formed part of a group.

TERRACE A1 (Figs. 4-6)

This was a small rectangular terrace measuring 10 x 4 m dug into the hillside with a conspicuous spill of shell midden exposed at the east end on the outer slope. It was close to the larger terrace A2 and slightly above it, and with a third terrace further down the slope, which was not investigated, made up a characteristic group.

Test bores were first made to determine the extent of the midden. The midden was then excavated in 50 cm wide strips moving from the edges inwards, but leaving a set of 50 cm square blocks for sampling. This 'advancing face' method was chosen in order to reveal the stratigraphy; it enabled a ten phase sequence of shell deposition to be established. The analysis is given in Appendix 1.

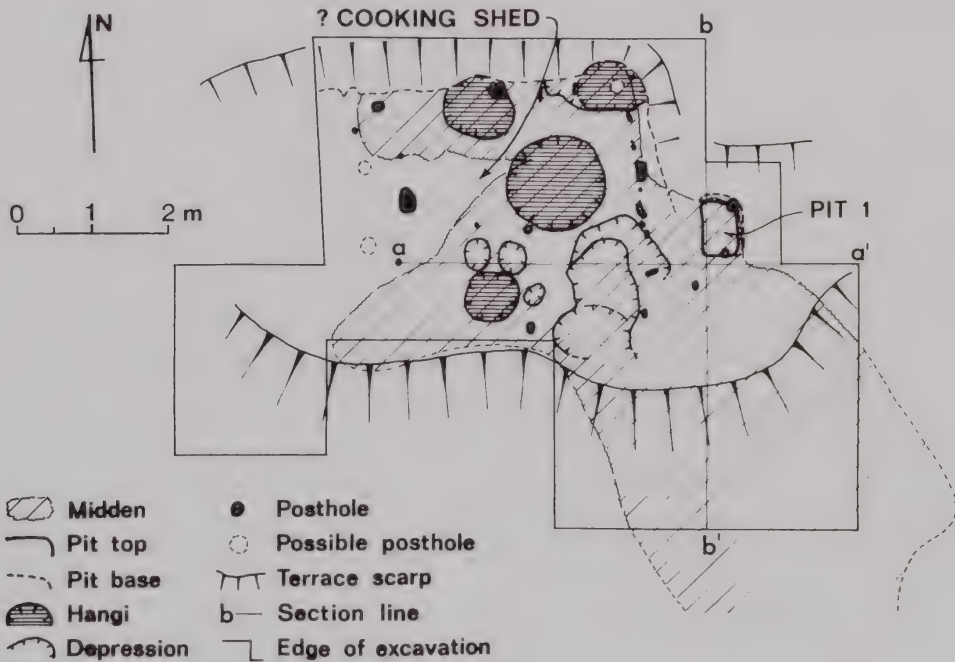


Fig. 4. Terrace A1, plan.

In general the midden was found to consist of pipi shells, with occasional lenses of cockles; it was about 30-35 cm deep, resting on a layer of brown sandy loam, the original ground surface formed on top of firm clean ash. The midden extended as a thin layer towards the centre of the terrace where it was overlaid by and mixed with pockets of charcoal, burnt stones and ash, the throw-out from a series of *hangi* (Fig. 5).

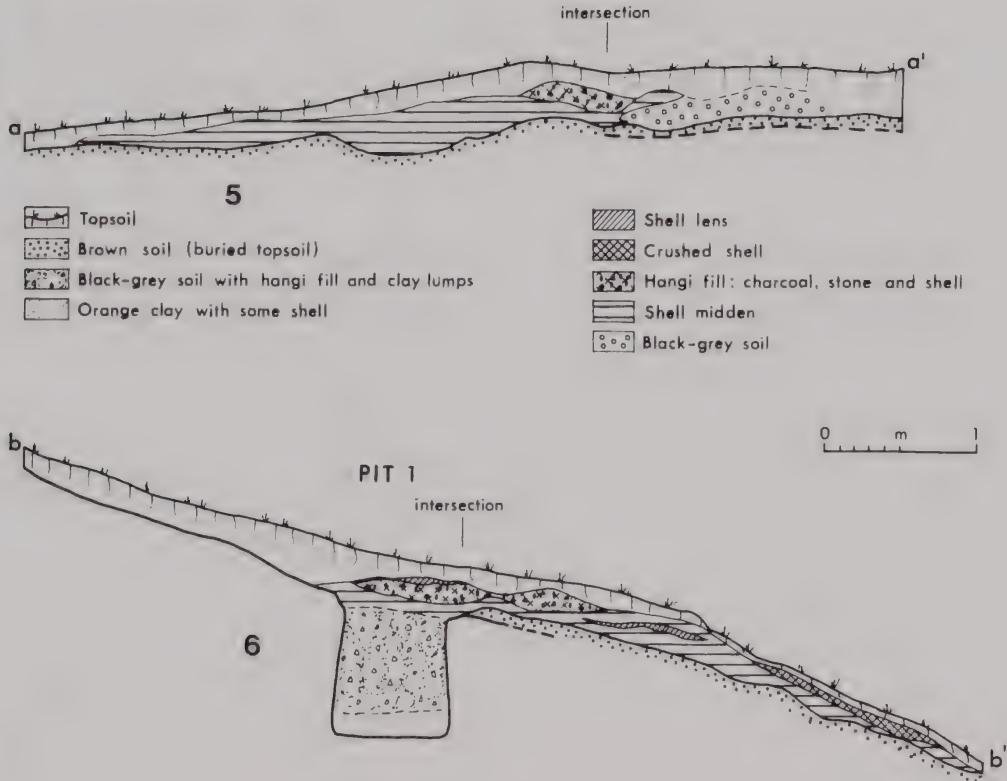
An area 5 m long by 4 m wide was then cleared from the centre of the terrace with lateral extensions to investigate special features. It was found that the area had been heavily used for cooking in circular *hangi* dug into the sandy loam to a depth of 6-12 cm. The largest, in the centre of the terrace, was 65 cm in diameter, the others 30-40 cm. Beneath the thick midden on the front of the terrace, there were other hollows (marked as depressions on Fig. 4), probably also remains of *hangi*.

On the firm ground at the back of the terrace, a series of postholes was found, indicating a rectangular timber construction measuring *ca.* 4 x 3 m. The north wall was at the foot of the scarp; one of the postholes 15 cm deep cut through a *hangi* and was visible at its base, showing that this was a secondary construction. The east wall consisted of seven small irregularly spaced holes, probably for slender uprights supporting panels of woven raupo. The intersection of the north and east walls as thus defined lay in the centre of another *hangi*, where an angle post has been conjectured on Fig. 4. The west wall line was disturbed by rabbit burrows and the two postholes shown therefore are treated as doubtful. Since no postholes could be found on the south side, the building is considered to have had an open front. Two large postholes, 45 and 26 cm deep, though they are not exactly central, indicated the position of uprights carrying a horizontal timber to support the lean-to construction (Fig. 47). No hearth or artefacts were found inside where midden continued to accumulate; probably it was a cooking shed providing shelter for the inhabitants for food preparation and at mealtimes. A small pumice disc (Fig. 30) was found south of the structure.

At the east end of the terrace there was an unusual bell-shaped pit (Pit 1), measuring 35 x 25 cm at the mouth and expanding to 50 x 35 cm at the bottom. There was a posthole at either end of the floor. It had been deliberately filled with dark soil with lumps of clay and ash from *hangi* and then covered by a layer of shell midden and more *hangi* waste (Fig. 6), indicating the pit was an early feature. Its purpose is uncertain; the excavators conjectured it was a latrine (*paepae*), but its infilling is against this. It is more likely to have been a specialised form of cool store; food in woven baskets (*kete*) or gourds could have been suspended from a horizontal bar between the two posts, and the opening covered by a wooden slab. Two perforated pipi shells (Figs. 27, 28) were found in the midden around the pit.

Chronology

The construction sequence on the terrace appears to be as follows; in the first phase, there was the construction of the terrace, the digging of Pit 1, and the use of the back and centre of the terrace for the *hangi*. In the second phase, the pit was filled up with *hangi* debris and an open fronted wooden cooking shed was constructed at the back of the terrace superimposed on two of the *hangi*. Much shell midden and some *hangi* material were deposited at the east end of the terrace, covering the mouth of Pit 1 and spilling down the lower scarp towards Terrace A2. No date was obtained for either phase.



Figs. 5,6. Terrace A1, sections.

TERRACE A2 (Figs. 7-9)

This was a large terrace close to and below A1; it measured 22 m long and 6-8 m wide; some midden was exposed midway along the lower scarp. When excavated it was found to contain four rectangular pits (2-5 on plan), each with the long axis parallel to the terrace, and a working place associated with the midden but no house structure. Together with another small pit (Pit 6) on a flat 2.5 m away to the south-east (see Fig. 8), it can be deduced that this was the storage place for the owners of the terrace A1 above.

The largest pit, Pit 2, was at the west end of the terrace at the foot of the back scarp; it measured 8 x 2.5 m and was 45 cm deep, cut in the firm orange ash. The lower layers of the filling were of clean yellow soil which had slipped in from the upper side; these were covered by a 20 cm thick layer of dark soil and charcoal and by another of brown soil, representing a deliberate infilling when the pit was no longer used (Fig. 9, Section a). Finds from the filling were an obsidian core (Fig. 19) and a piece of siliceous sinter, a stone polisher (Fig. 36), and three pumice objects, a head and a crudely carved face and a stopper for a gourd (Figs. 32-34). A broken adze blade of imported South Island argillite was found at the top of the filling (Fig. 17). A series of small postholes, 10-20 cm deep in the centre of the pit floor indicated that this long pit was roofed, with a ridge pole carried on at least four supports in the deeper holes. Alternatively the excavators thought it might have been an aisled construction with a cantilevered support for the rafters resting on two

rows of side posts (Fox 1974:144, fig. 2). Unfortunately insufficient of the pit floor was uncovered to find more than one posthole in a possible second side row. Duplication of some central postholes indicates that the pit had been re-roofed. Other features were three small depressions in the south-west corner of the pit, and a hollow in the south-east corner undercut in the manner of a *rua*. There was a rectangular setting of five postholes on the terrace 40 cm away from the pit edge; these may have held posts to secure the ends of the rafters and to prevent the south-west corner of the roof lifting in the prevailing strong westerly sea winds.

Pit 3 was in the centre of the terrace; it measured 3.2 x 1.5 m and was 75 cm deep, with a firm floor of consolidated ash and sandstone. There were three postholes forming a central row for timber uprights to support a ridge pole for the roof. The lowest layer of the filling was a natural accumulation of 'reddish-yellow gritty clay' (ash), which had slipped from the sides, covered by a deliberate infilling of 'brown soil flecked with charcoal' sealed down by a thick layer of clean yellow soil in which a seam of charcoal was conspicuous in the cross-section (Fig. 9). The clean soil for infilling was probably obtained from the digging of another pit. One curious feature was noticed in this pit and the nearby Pit 4. Along the upper part of the pit sides, there were slots filled with sandy brown soil, 20-30 cm deep and in some cases continuing to the pit floor (Fig. 8). This was at first thought to be the remains of a lining of plank-like timbers, perhaps split *ponga*, to prevent slips from the pit sides where it was dug in sandy soil. This seems very reasonable and has analogies elsewhere in Auckland and the Bay of Plenty (Fox 1974:149). However, it was concluded later that the slot was the result of the filling not being properly consolidated; consequently soil had slumped inwards from the pit sides creating a space, which subsequently was filled by blown sand and humus.

Pit 4 was dug at the back of the terrace; it measured 3.2 x 2.5 m and 65 cm deep. A cross section (Fig. 7) showed that the terrace had been built up on the lower side, with successive layers of grey ash and yellow mixed soil with lenses of black soil in places, to a height of 40 cm. The pattern of postholes in the hard reddish ash of the pit floor indicated a central ridge pole supported on two uprights, with others perhaps marking divisions at the sides similar to those in Pit 2. The pit filling revealed some secondary use; after 40 cm of

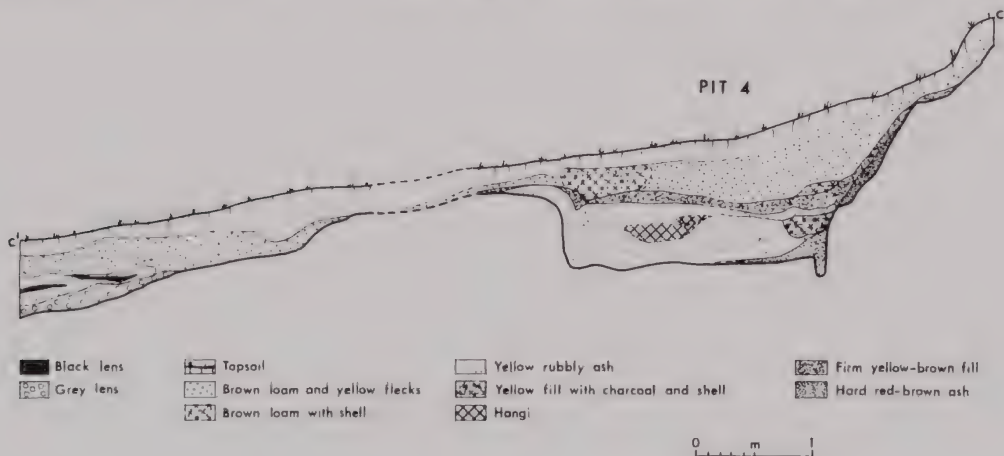


Fig. 7. Terrace A2, section.

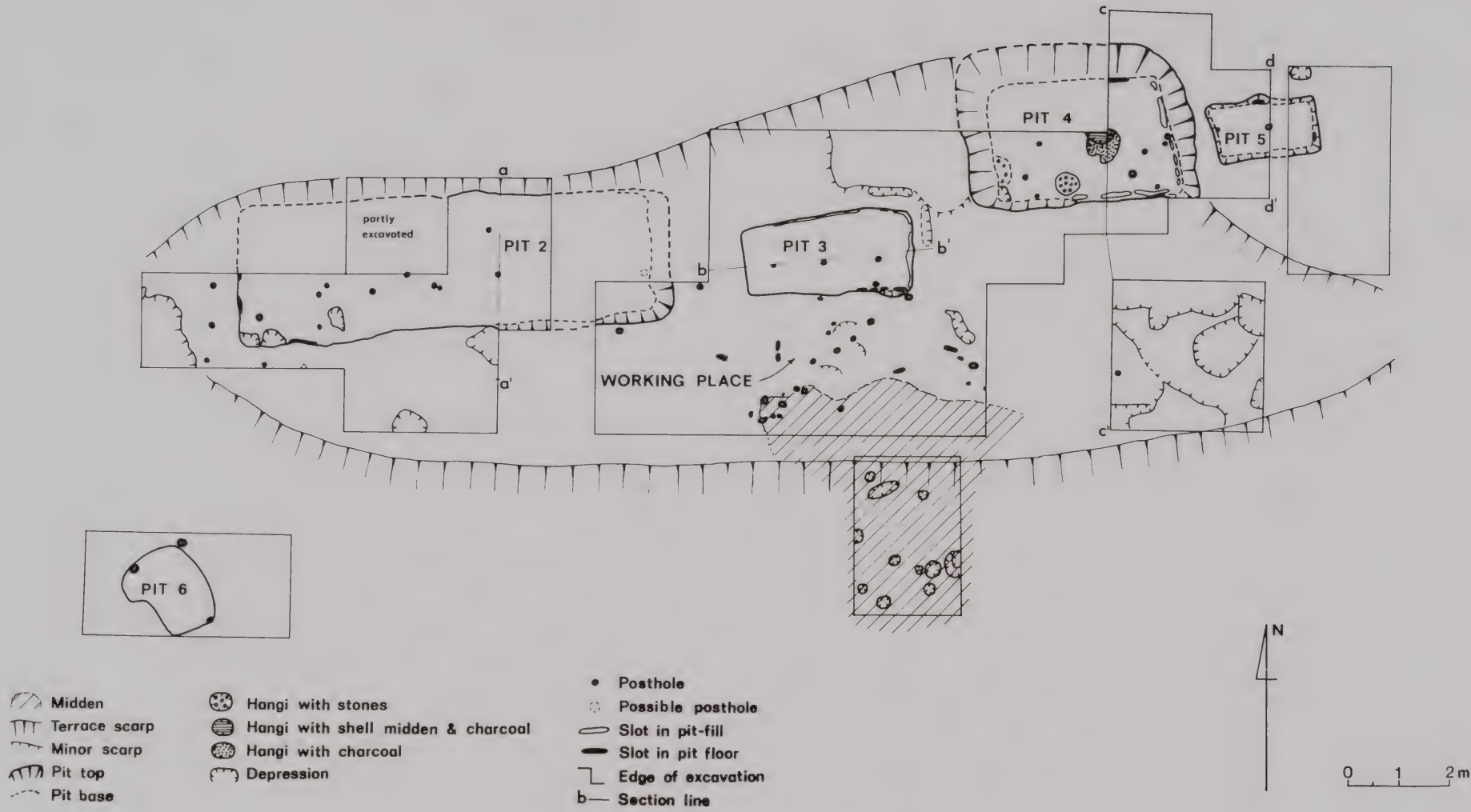
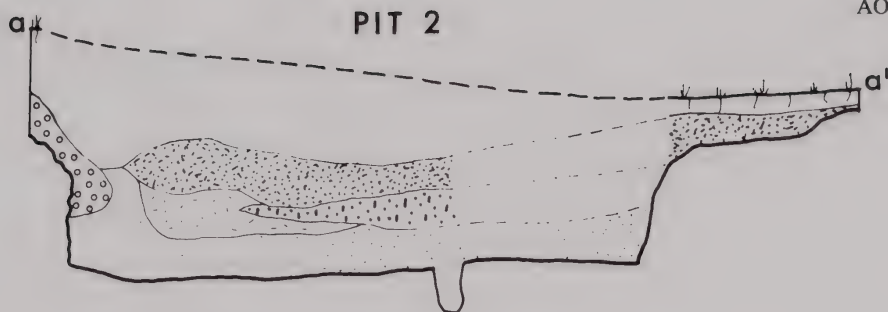
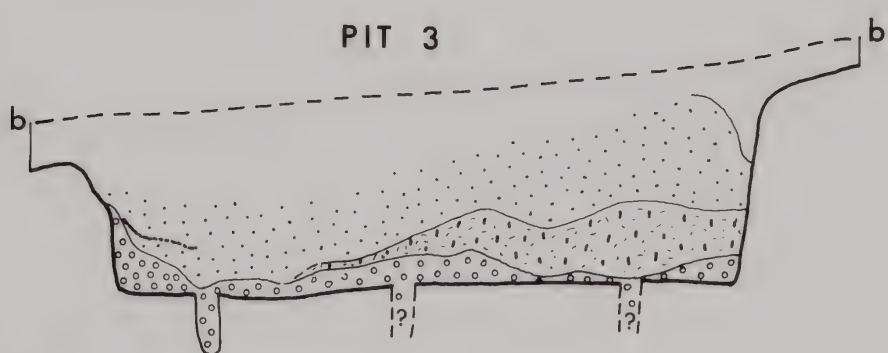


Fig. 8. Terrace A2, plan.



- | | |
|-------------------------------|-------------------|
| Topsoil | Yellow-brown soil |
| Brown soil with orange flecks | Yellow ash |
| Dark soil with charcoal | Orange ash |

0 m 1



- | | |
|--|------------------------|
| Hard yellow clay | Charcoal lens |
| Brown greasy fill with charcoal flecks | Yellow-red gritty clay |

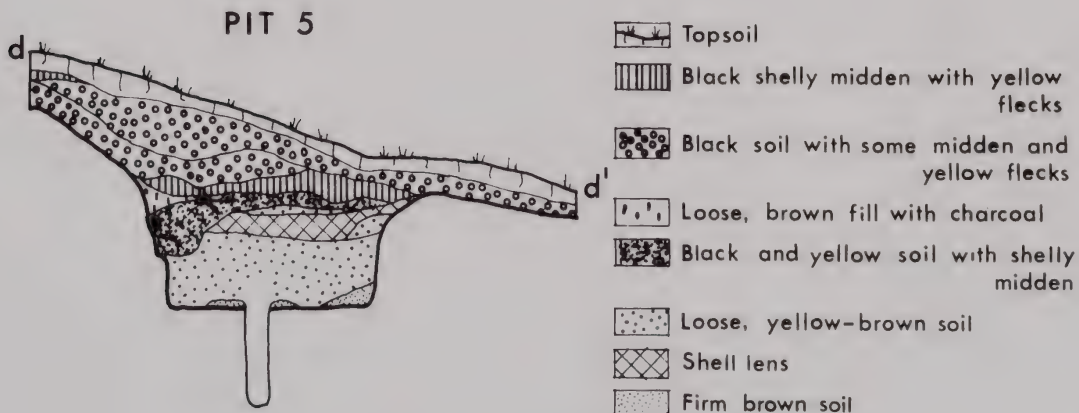


Fig. 9. Terrace A2, sections.

“soft yellowish rubbly soil” had slumped into the pit, cooking had taken place in the shelter of the hollow. In the centre there were two hearths, one above the other with much ash and charcoal, and some shell midden in the upper example. Two *hangi* at the south end of the pit retained their original filling of heated stones. An obsidian blade (Fig. 20) and a pebble pounder were also found at this level. A series of slots were recorded in the upper part of the pit filling along the east and south sides. It is clear from the section (Fig. 7) that there was a quantity of slip from the nearby back scarp of the terrace, which covered the cooking place to a depth of 40 cm. This favours the suggestion that the slots had held a plank revetment (protecting the cooking place) which probably had been removed when the terrace was abandoned, resulting in a run of soil followed by hill wash from above.

Pit 5 was separated from the main terrace, being placed on sloping ground above the scarp. It measured 1.4-0.8 m and 58 cm deep. It had only two central postholes for the supports of a ridge pole, none at the east end where the entrance may have been situated. The centre post was driven 25 cm into the natural soil (Fig. 9). The primary filling was a natural accumulation of “yellow brown rubbly soil” 30 cm deep which had fallen from the sides. This was covered by four successive layers of shell midden separated by bands of yellow and black soil. A possible posthole or side slot was detected cut into the primary deposits and subsequently filled with midden. There were no signs of a secondary occupation in this pit; all the midden layers appear to have been thrown down or slipped from the hillside above until the pit overflowed; their source was almost certainly Terrace A1 above. A small greenstone fragment was found in the pit filling, possibly from a chisel.

There was another detached pit (Pit 6) at the south-west end of the terrace 2.5 m below the scarp on flat ground. It was an irregular kidney-shape 1.65 x 1.75 m and 50 cm deep, with the sides slightly undercut. There were three postholes in the angles suggesting a tripod-like construction, perhaps for suspension of food in containers as in Pit 1. Details of the pit filling were not recorded.

The three pits, 2, 3 and 4, took up most of the available space leaving only a narrow strip on the front of the terrace. Excavations here showed a series of small postholes, and a spread of ash and shell midden as well as shallow depressions and levellings in the made ground. No major structures were evident but irregular settings of posts suggest that screens or little shelters may have been erected. A triangular setting of three posts may have been supports for a drying rack, similar to those shown in the deserted Kahouwera pa, Bay of Islands, drawn in 1827 (Fox 1976:fig. 2). Although no hearths were found, the spread of ash and midden showed that the preparation or cooking of shellfish had taken place near by, similar to that in the disused Pit 4. It is therefore likely that this was a working place where people sat sheltered from the wind and prepared kumara and other products for pit storage or for drying or cooking. A bone fishhook fragment (Fig. 26), a basalt pebble tool and some pumice fragments were found here.

Chronology

It is clear that there were two phases of occupation of the terrace; in the first, three pits were dug on the firm ground at the back and were roofed; there is no evidence to prove or to disprove that these were contemporary or successive constructions. In the second phase, one pit, Pit 4, was disused and soil slipped into it to a depth of 40 cm: two

stone-filled *hangi* and hearths were then made in the shelter of the half-filled pit, which was revetted with slabs at the sides and used for cooking in conjunction with the working place at the edge of the terrace, where shell midden was deposited. The other three pits, 2, 5 and 6, probably continued in use until the terrace was abandoned. No carbon samples were taken.

TERRACE A4 (Figs. 10,11)

This was a large terrace above and to the east of A1: there were three small terraces adjoining it, each with the surface indication of a rectangular storage pit (Fig. 3). Only the large terrace A4 was excavated; it measured 17 x 6 m and proved to have a complicated history. The features will be described in order from west to east.

At the west end of the terrace a series of postholes indicated that there was a small house built at the foot of the scarp, with a porch or verandah facing east on to an open space. There was a deep bin pit, Pit 9, 72 x 55 cm and 85 cm deep, on the edge of the terrace beside it. The house structure is problematical; the front wall is well defined by a line of three postholes, completed by a fourth at the north-east angle where a 'depression' was recorded. The northern side wall, at the foot of the scarp, was obscured by a rabbit burrow, but the line of the back wall was established from three postholes with another post conjectured at the south-west angle, which however was not identified at the time of excavation. The overall dimensions thus obtained are 2.25 x 1.9 m; in addition, a porch 0.85 m deep is indicated at the east end by two postholes 1.5 m apart. The house floor had been disturbed by a rabbit burrow and no hearth was found. It is possible that a depression in the centre of the porch had been a warming place, on the analogy of similarly placed hollows found filled with heated stones in several houses at Pouerua, Bay of Islands in Sutton's 1983 excavations. Inside the house, a line of three close set postholes indicated the position of timber uprights carrying the ridge pole. Since these are off-centre, it can be conjectured that the rafters on the north side were carried over the wall line for the ends to rest on the terrace scarp (see reconstruction, Fig. 47); alternatively, that the roof was of a different pitch on either side of the ridge. Double postholes, one in the front wall and one in the porch, indicate that two posts had been replaced. Similarly some of the internal ridge supports may be replacements because the number seems superfluous in such a small house. Finds from the house were a bone fishhook (Fig. 25), a stone file (Fig. 23), and an obsidian blade (Fig. 18) and four flakes.

In front of the house there was an open space, extending right across the terrace. Two isolated postholes 1.3 m apart suggest a drying rack aligned so as to face the prevailing westerly winds. Beyond this, the centre of the terrace was honeycombed by a series of small hollows or depressions, interspersed with groups of postholes and stake-holes from which no obvious structure could be detected. Like the similar remains on Terrace A2, this was probably a domestic working place where people sat preparing fish, shellfish, kumara and other food for cooking in the *hangi*, or for drying or storing. A pumice abradar (Fig. 38), a sinker (Fig. 37), a pebble pounder, as well as five flakes of obsidian and one of chert were found here and suggest that some manufacture also took place. At the edge of the terrace there was an extensive shell midden which continued over the scarp (Appendix 2).

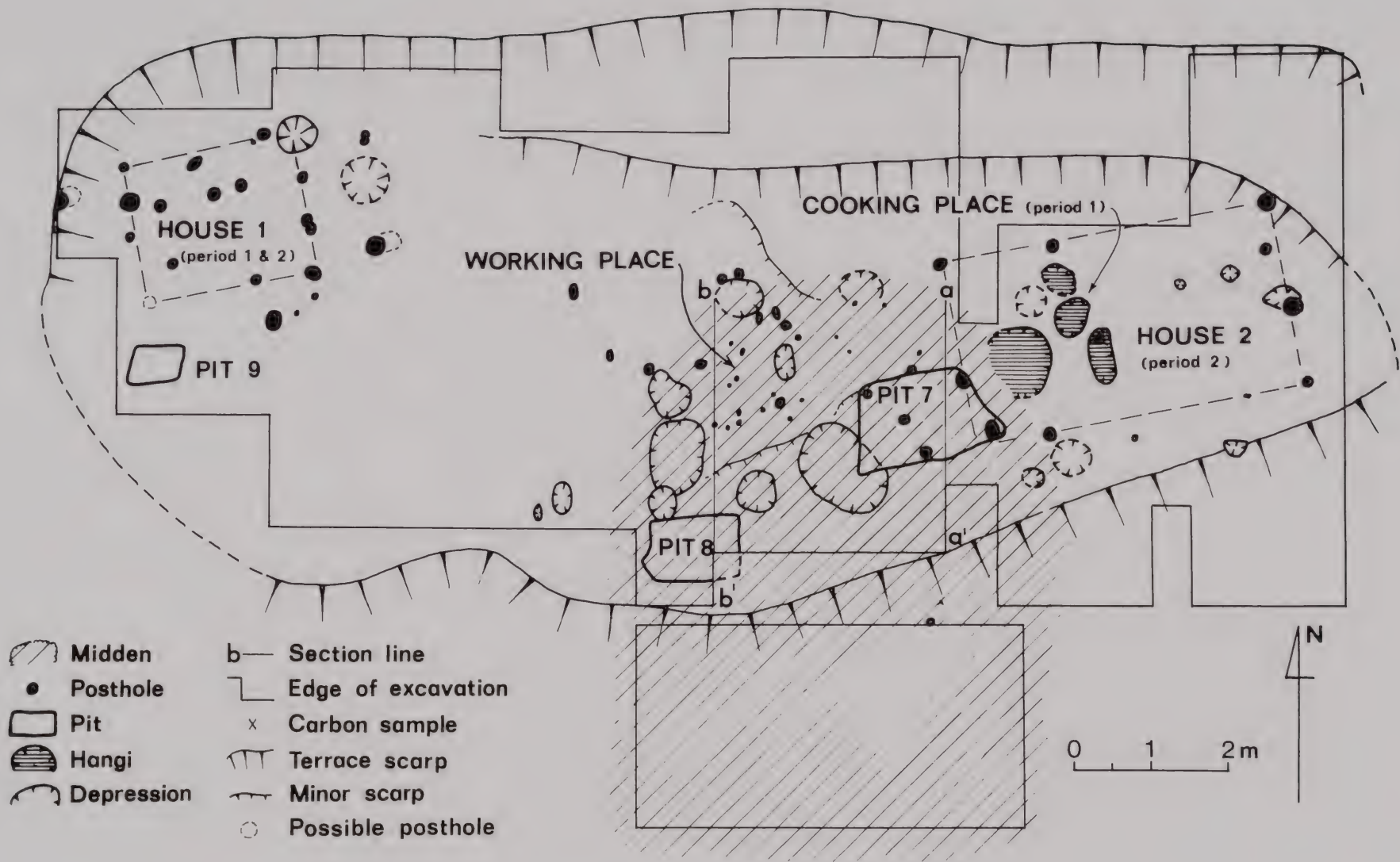


Fig. 10. Terrace A4, plan.

Shells from the lower layers yielded a radiocarbon date of 430 BP \pm 50 (A.D. 1520), others from a higher layer 390 \pm 50 B.P. (A.D. 1560) (see Appendix 3). Beneath the midden there were two small pits, Pit 7 and 8, which had been filled in previously. Pit 8 measured 1.20 x 0.80 m and was 90 cm deep; it had been cut through layers of 'brown greasy soil' and clean orange soil (redeposited ash) which made up the base of the terrace. The pit was filled with layers of midden of differing consistency, but mainly burnt shells, charcoal and wood ash from *hangi* (Fig. 11, Section b). A sample of charcoal from the bottom of the pit produced a corrected radiocarbon date of 440 BP \pm 40 (A.D. 1510). The second small pit, Pit 7, measured 1.80 x 1.05 m and 85 cm deep and had been cut through part of a 'depression' (Fig. 10.) It was an irregular shape when excavated, probably because parts of the sides had fallen away when two postholes belonging to the later House 2 had been inserted into the filling at the east end. The pit was filled with dark brown soil and shell, and like Pit 8 was covered by the later midden (Fig. 11, Section a). There were three postholes on the floor, one central, two at the sides, showing that the pit had been roofed, and probably revetted at the sides. A bone fishhook point was found in the filling (Fig. 24).

Close to the pit at the east end of the terrace, there was a cooking place with at least four *hangi*, each placed in a shallow oval depression 6-12 cm deep, containing ash and charcoal. One of them had been cut by a posthole 25 cm deep extending down from the layer above. Other postholes 10-18 cm deep outside the cooking area indicated two sides of a rectangular structure, 4.4 m long by 2.5 m wide. The outline was completed by the two postholes 16 cm deep found in the filling of Pit 7 and by another 17 cm deep in the made ground near the edge of the terrace. The single post which penetrated the *hangi* is central to the structure and is likely to have been a support for a ridge pole and implies that the building was roofed (Fig. 10). There was no evidence of its function; it could have been a second sleeping house (*whare*) or a store (*pataka*). It is clear that it was the latest construction on the terrace. A small pumice cup (Fig. 29) and a sandstone file (Fig. 22) were found.

Chronology

Three phases of occupation are apparent on this terrace. The first consisted of the building of the small House 1 with a bin (Pit 9) nearby, the use of the working place for domestic activities, and the cooking place with group of *hangi*. In the second phase, Pits 7 and 8 were dug, cutting into existing hollows (depressions) in the working place. Pit 8 was subsequently filled up with midden probably from the cooking place and yielded a corrected radiocarbon date of A.D. 1510 \pm 40 from the lowest layer. A quantity of shell midden continued to be produced and was deposited on top of the filled-in pits and strewn down the terrace slope; samples of shells produced two radiocarbon dates of A.D. 1520 \pm 50 and 1560 \pm 50. In the third phase a rectangular timber structure was erected on top of the cooking place: one of its postholes cut into a *hangi* and two others were inserted in the filling of Pit 7, belonging to phase 2.

The three radiocarbon dates show that phase 2 can be dated within the time span of A.D. 1460-1610, and most probably during the first half of the 16th century.

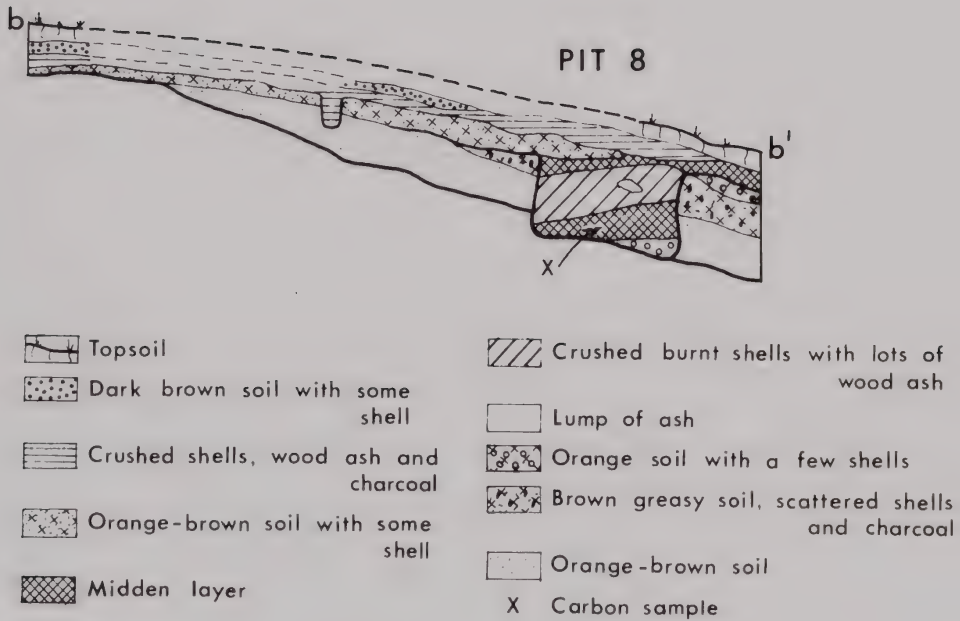
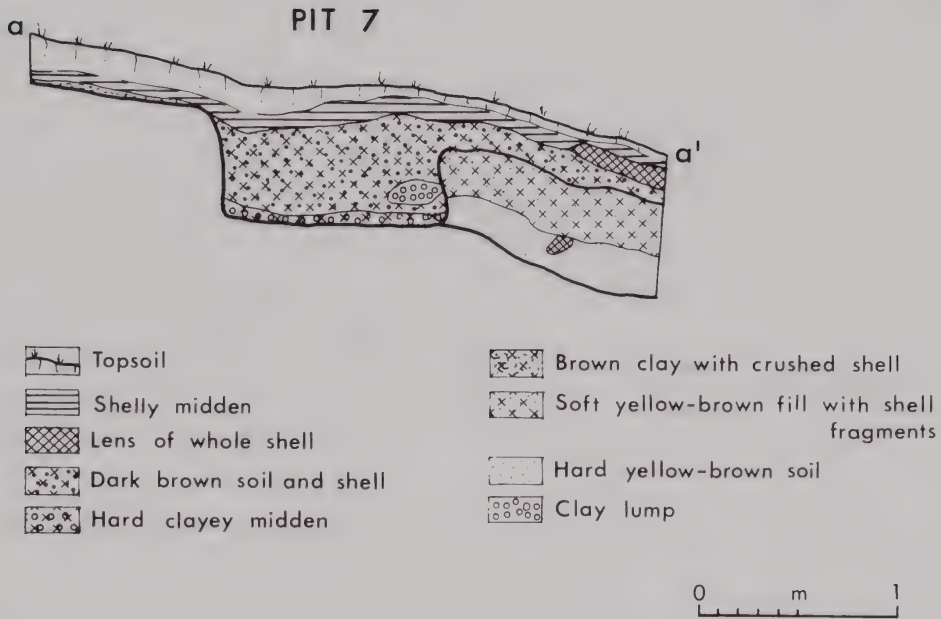


Fig. 11. Terrace A4, sections.

TERRACE A6 (Figs. 12-14).

This was a long narrow terrace measuring 23 x 5 m situated at the top of the slope, with two small satellite terraces above and to the east of it, one originally designated A5. Like terrace A2 it was an area for pit storage. Excavation was limited to investigating the six pits, and to uncovering sufficient of the remaining space to show that there was no house or other structure present.

At the west end of the terrace immediately below the scarp, there was a pit, Pit 10, cut in the natural sandstone to a depth of 1 m. The sides had been undercut in places and the irregular shape is probably due to the difficulties of cutting in the rock. No postholes were found in the floor and its storage capacity must have been limited; it probably was designed for a special need. The section (Fig. 13) shows that only a thin layer of sandy soil had accumulated on the floor before it was filled in by layers of dark brown and black greasy soil containing a sandstone rubber (Fig. 31) as well as pieces of broken sandstone from the sides. These were covered by a layer of brown soil, probably a natural accumulation of humus and wind-blown soil, after the terrace was deserted.

A much larger pit was Pit 11, a long narrow pit measuring 6.7 x 1.8 m and 70 cm deep. A central line of five postholes 25 to 33 cm deep, including one replacement, indicates the position of supports for a ridge pole. Two other postholes, 43 and 36 cm deep, may have held additional supports on the south side of the ridge; there were also several small stake holes, 8 to 10 cm deep. Another feature was a deep rectangular slot on the northern side of the floor, perhaps a bin rather than a drainage sump. The entrance to the pit was probably by way of a shallow recess in the south side. A section (Fig. 14) showed that the pit had been filled with yellowish-brown earth to a depth of 50 cm, covered subsequently by slips of cleaner soil from the terrace scarp and by a natural accumulation of dark brown humic soil, forming the present surface. A scraper of siliceous sinter (Fig. 21) came from the filling of this pit.

In the space between Pits 10 and 11 there was a small pit, 15, at the back of the terrace; it measured 2.25 x 0.85 m and was only 30 cm deep. It seemed to have filled up naturally, first with a slip of light brown soil with charcoal from the sides and then covered by the usual humic brown soil, here washed down from the terrace scarp behind the pit (Fig. 13, Section b). In the surrounding flat area, which was only partly cleared, there were a few small postholes and shallow depressions but no hearths, *hangi* or shell midden. A few pieces of obsidian were found in the surface soil.

On the small terrace north of and above Pit 11, there were the two pits, 12 and 13. Pit 12 measured 2.6 x 1.8 m and 1.25 m deep; it had a central row of three postholes for the roof supports. Pit 13 was a shallow bin pit, 1.4 x 0.85 m and only 30 cm deep; it is small enough to have had a wooden cover. It seems to have been partly cut away when Pit 11 was dug (Fig. 14). Both pits had a filling of yellowish brown soil covered by a thick layer of dark brown humic soil washed down from the hillside above into the hollow of Pit 12 and thinning out over Pit 13 (Fig. 14). The sixth pit, Pit 14, on the satellite terrace to the east, was 2.6 x 1.2 m and 70 cm deep. Only the eastern half was completely excavated, revealing two postholes for ridge supports on the central axis: a third may be conjectured at the west end, by analogy with Pit 12. A section (Fig. 13) showed an initial slip of yellow soil from the side, covered by dark brown soil with charcoal, and like Pit 12, a final layer of humic soil washed down from above.

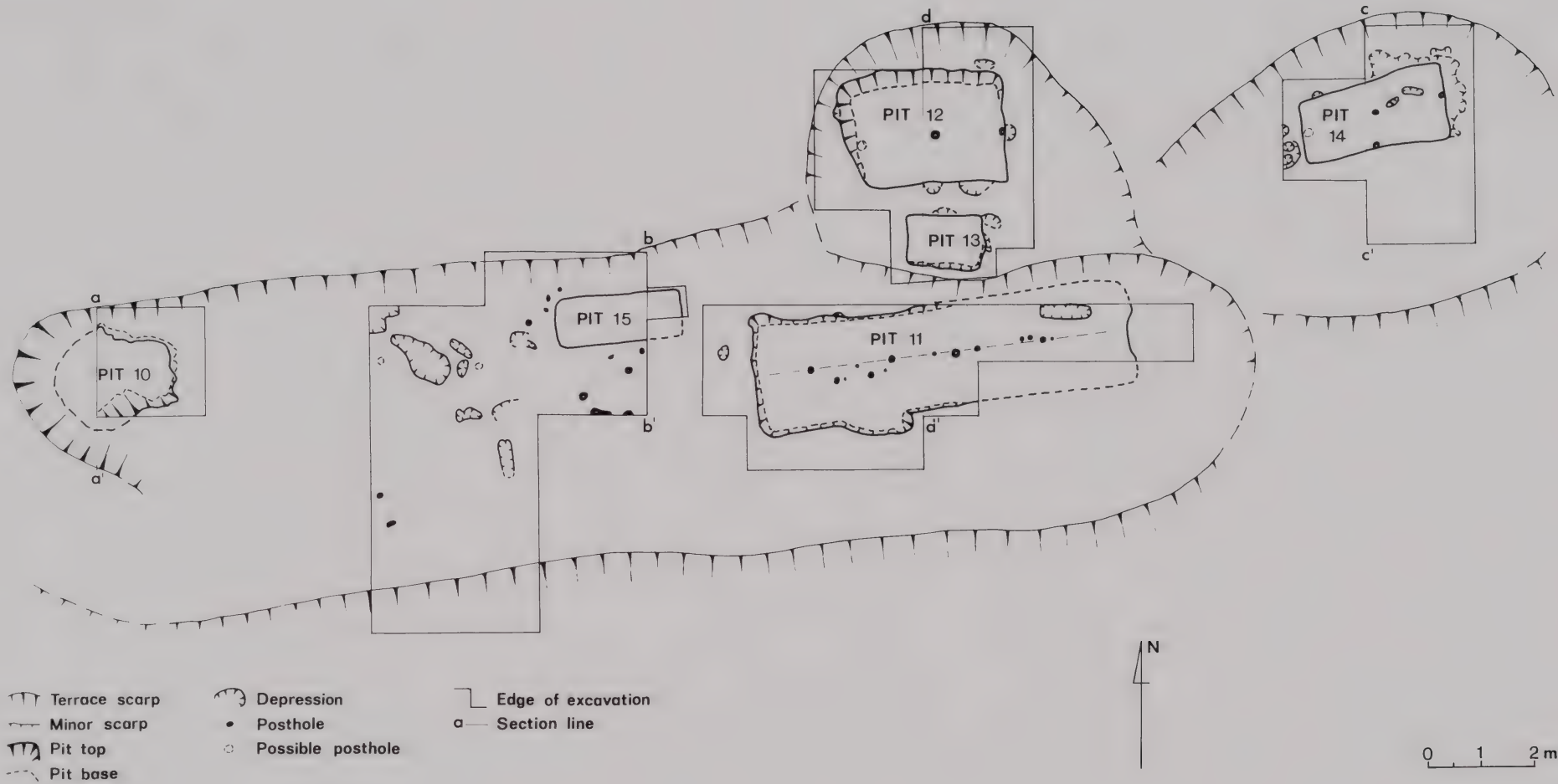


Fig. 12. Terrace A6, plan.

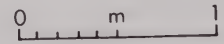
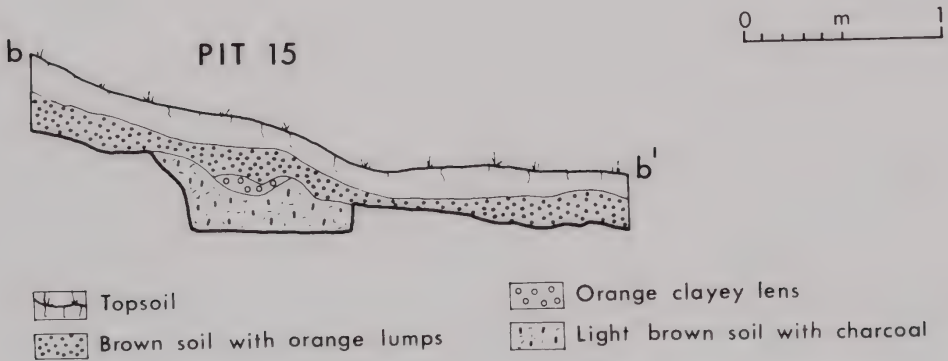
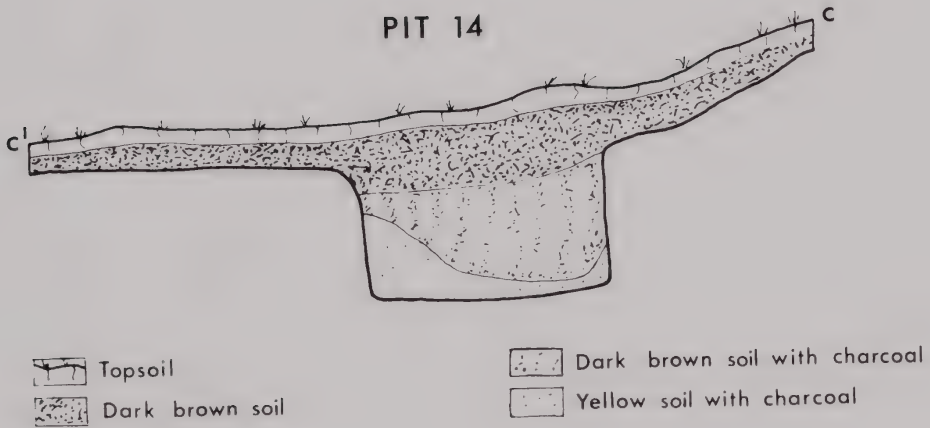
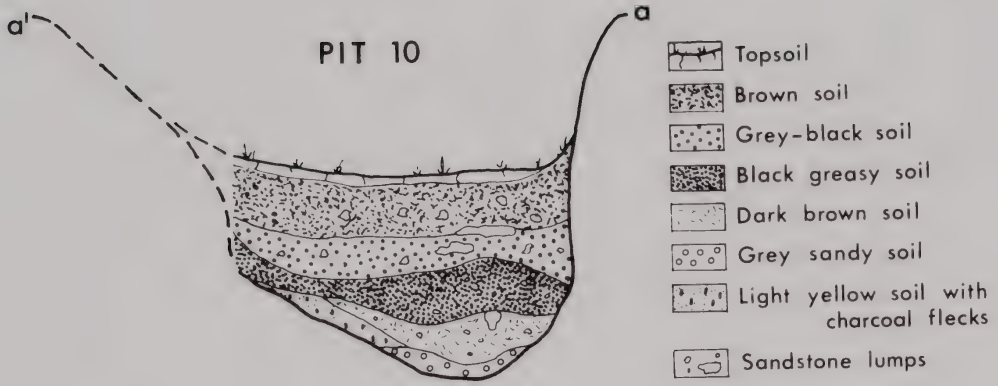


Fig. 13. Terrace A6, sections.

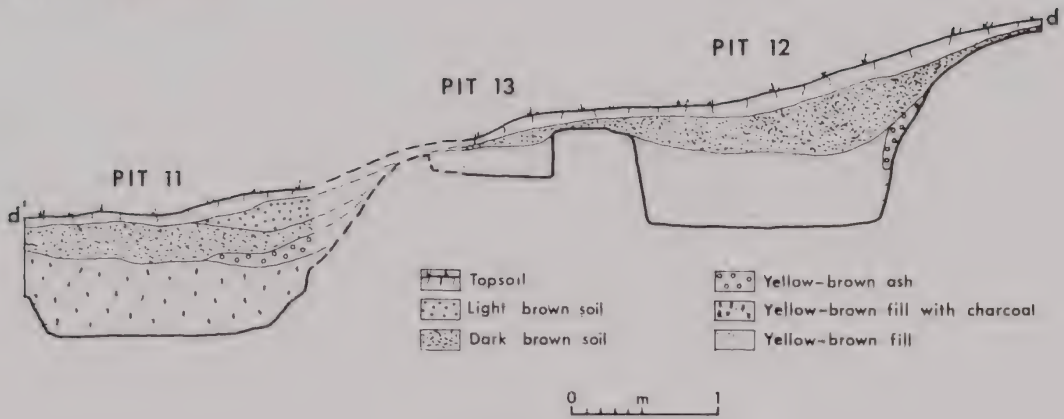


Fig. 14. Terrace A6, section.

Chronology

No dating evidence was obtained but the regular layout of the pits and the uniform construction indicate that these are all of one period. Pit 10 was deliberately filled, the others were filled up by the natural forces of erosion, slip and hill wash.

MAORI CULTIVATION, MADE SOILS AND BORROW PITS (Figs. 15-16)

At Cassels' suggestion, a systematic study of the borrow pits south of Manuaitu pa was carried out by Tony Walton; relevant parts of his work and some original illustrations are included in this report (Figs. 15-16). There are approximately 105 'borrow pits' in the whole area; they appear as circular or irregularly shaped sinkages, 5 to 30 m in diameter and from 7 to 3 m deep, which show up well on air photographs. The distribution shows that most occur in the vicinity of the small pa N64/10 Pukerewiti and N64/190 now both destroyed, and of terrace and pit sites, such as N64/25 of this report. Like the settlements, the pits are situated on the flanks of the low ridges and only exceptionally in the shallow valleys. Some of the pits are thought to be of natural origin, starting as a sinkage deepened by wind erosion. Walton demonstrated that the majority are man-made and were cut into the sides of the ridges in the manner of an adit, showing "a characteristic high face on the up-slope of the pit"; there are also shaft pits with sides of near even height. The locations were chosen where the natural cover of tephra (ash) was thin and there was relatively easy access to the underlying sand.

Test excavations were carried out in five pits situated between the settlement N64/25 and the former pa Pukerewiti: these are marked a-e on Fig. 15 and were recorded as site N64/191. The reconstructed section dug across Pit e (Fig. 16) showed that it had been cut through a 30 cm layer of ash to reach the sand substratum and continued to a depth of 3 m. The pit floor was covered by an infilling of redeposited ash, and by loose sand, which had slipped in from the sides; a thin lens of shell midden indicated a temporary stabilised surface. The other test holes in the centres of Pits a-d showed that each had been dug to the sand substratum at depths varying from 0.80 to 1.5 m below the present surface (Fig. 16). Layers of shell midden or of charcoal in the natural accumulation of loose sand filling the quarry indicated subsequent human activity and the use of the hollow for minor rubbish disposal. A sample of shells from the midden in the filling of Pit b was dated by radiocarbon analysis to 420 B.P. \pm 40 (A.D. 1530), which is practically the same as the dates

obtained from midden on Terrace A4 (Appendix 3). It was thus clearly established that the borrow pits were ancient sand quarries, dug and used at the same time as the main settlement was occupied in the early 16th century (Walton 1983).

There is however another specialised use for sand in kumara cultivation that seems to have passed unnoticed, namely its use in seed beds for sprouting the parent tubers before these were divided and planted out. The late Mr Eruera Stirling has given a vivid account of the practice near East Cape by his mother, the formidable Mihikotukutuku in the 1890s.

“My mother was a real expert . . . She grew an acre of kumara on the same patch of ground every year near the old homestead at Raukokore and she stored the tubers in a pit called *Te Rua kumara a Te Ao-o-tata*, dug by my great-grandfather Te Ao-o-tata. After each harvest Mum selected seed tubers from the best kumara, nice shaped ones with plenty of eyes and she stored them to one side of the pit. She watched the moon and at the right time, near the end of August, she'd prepare the seed bed, always in the same place. She laid the kumara on the bed side by side, then she'd get good clean sand from the beach and cover them over. After that some fine grass was cut and put on top, then Mum buried the bed with fine soil and put a bit of gravel over it. The sand gave warmth to the kumara and they'd shoot out quickly. . . . Within a month all of the shoots were sprouting out of the ground and Mum would start watching the moon for the right planting day.” (Stirling & Salmond 1980:102)

It is clear from this account that the functions of sand and gravel were distinct and well recognised: sand is commonly used today by horticulturists for striking cuttings. Obviously there can be no evidence that such seed beds were made in Aotea in the 16th century, even perhaps in some of the borrow pits, but the possibility should be borne in mind.

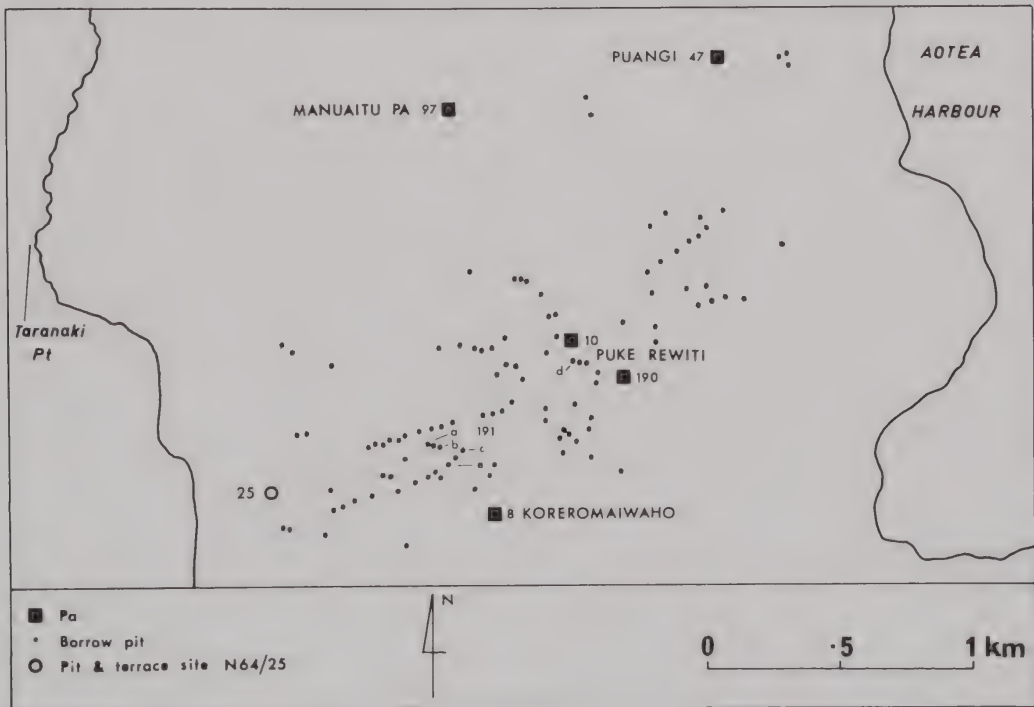


Fig. 15. Distribution of borrow pits near N64/25. For location see Fig. 2. (After Walton MS.).

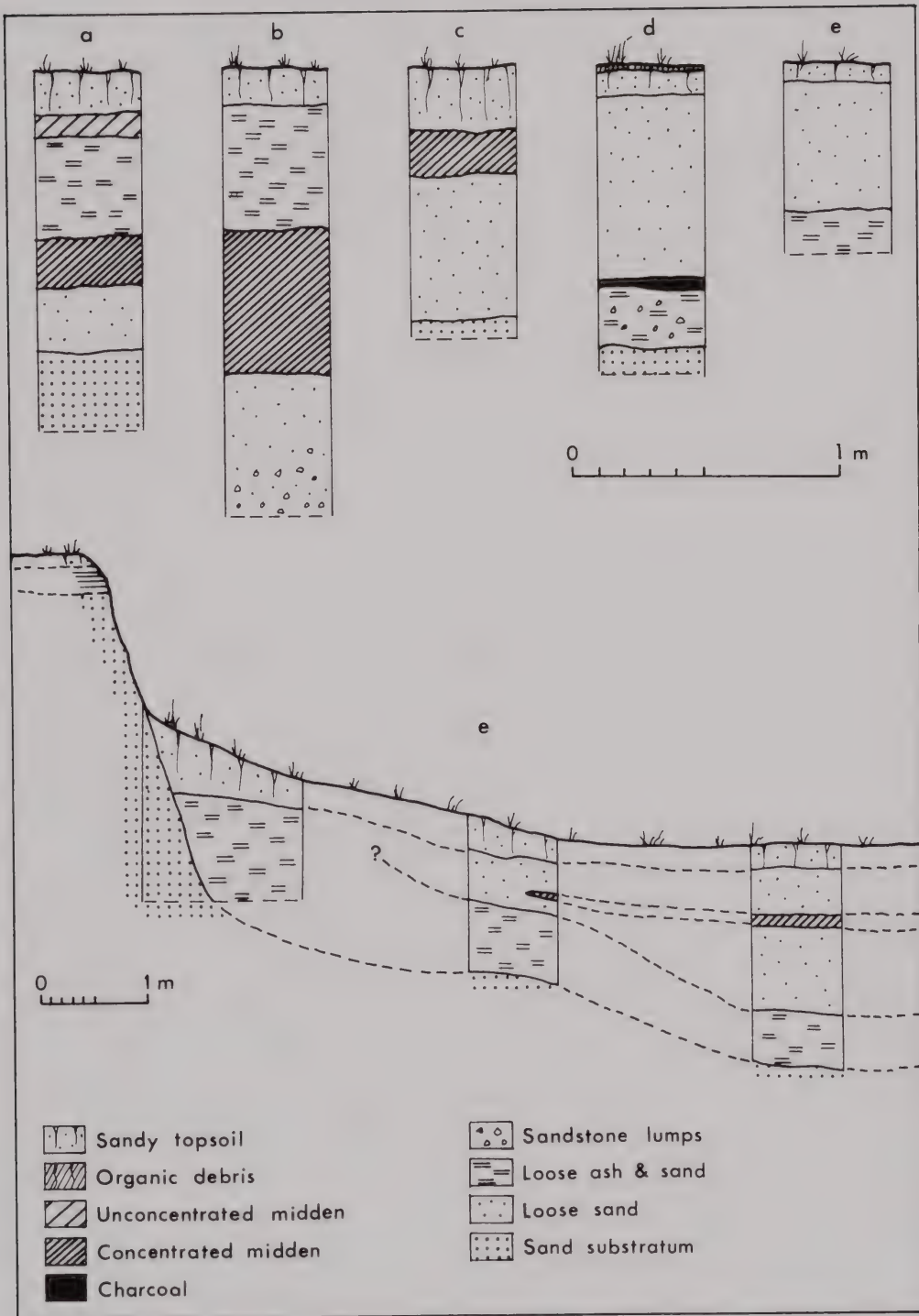


Fig. 16. Sections of the filling of N64/191 borrow pits a-e. For location, see Fig. 15. (After Walton MS.).

CATALOGUE OF FINDS (Figs. 17-38)

All the finds and a manuscript catalogue have been deposited in the Waikato Art Museum, Hamilton. Geological identifications were made by Dr Grant-Mackie and colleagues at the Geology Department, University of Auckland.

Adze blade (Fig. 17), broken, metasomatised argillite, dense grey polished surface with dark veining characteristic of the Ohana quarries, D'Urville Island. The cutting edge is worn: insufficient remains for a cross section, but it is not an early type. Compare a similar small specimen from Maioro (Fox and Green 1982:Fig. 16 and p.72) which was imported likewise probably in the 15th or 16th century. A2. Layer 1. At top of filling of Pit 2, S.E. corner. Catalogue No. 1.

Obsidian blade (Fig. 18), a flake tool with cutting edge and tip serrated by use and back steepened by secondary working (retouched). Material from Mayor Island. A4. House 1, layer 1. Cat.No. 44.

Obsidian core (Fig. 19), a thick flake from which a series of small flakes have been detached on either side; indications of use on two edges. Material from Mayor Island. A2. Pit 2, filling layer 2. Cat.No. 45.

Obsidian flake (Fig. 20), with some use at base of blade. Material from Mayor Island. A2. Pit 4, surface. Cat.No. 46.

Flake tool (Fig. 21), of pinkish siliceous sinter; cortex remaining at base. One edge has been steepened and used, probably as a scraper. The source of this volcanic material is probably the Coromandel. A second similar yellowish piece was found in A2, Pit 2, layer 3, and the same material was used for drill points at Kororomaiwaho pa (Fig. 43), A6, Pit 11. Cat.No.10.

Stone file (Fig. 22), a rounded sandstone pebble with surface worn by use and battered at both ends. The material has been identified as a Jurassic sandstone, probably from south of Kawhia or from inland Waikato. The pebble may have been transported naturally to the local beach. A4. East end, in or south of House 2. Cat.No.4.

Stone file (Fig. 23), pointed, made from similar Jurassic sandstone to No.22. Slim pointed files were used in the manufacture of bone fishhooks. For another example from Kororomaiwaho pa, see Fig. 46. A4. West end, south of House 1. Cat.No.3.

Point of two-piece bone fishhook (Fig. 24), probably made from a bird bone. It has broken at the point of attachment to the shank. Compare Leach, 1979:103, Fig. 17, for the type. A4. Pit 7, filling, layer 2. Cat.No. 17.

Point of a two-piece fishhook (Fig 25), made from a dog's tooth. The tip is missing: the indentations at base are for lashing to the shank. A4. West end of House 1. Cat. No.16.

Piece of bone fishhook (Fig. 26), angular and much abraded. A2. Working place, layer 3. Cat. No.19.

Pipi shells (Figs. 27-28), with perforations, possibly artificial, 6 and 4.5 mm in diameter for suspension; the hole of Fig. 27 shows signs of wear. These shells were probably used for ornaments, as earrings or as part of a necklace. A1. In midden around Pit 1. Cat.Nos 42-43.

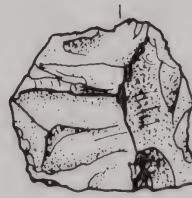
Pumice (Fig. 29), hollowed out and smoothed to make a shallow cup; probably a container for tattooing pigment. Compare a large example from One Tree Hill summit (Fox 1977: 18 and Fig. 16). A4. East end, House 2, layer 1. Cat.No. 25.



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19



20



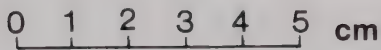
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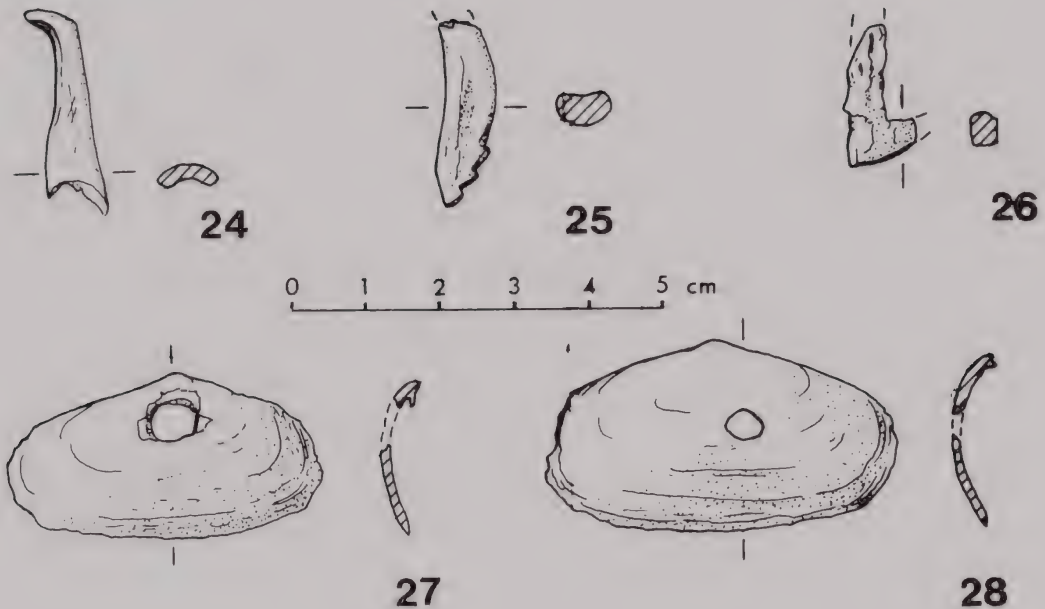
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23



Figs. 17-23. Stone artefacts from N64/25.



Figs. 24-28. Bone and shell artefacts from N64/25.

Another larger and better finished example with a lid was found by the former landowner, Mr Kain, on midden exposed on the dunes near North Head. It is illustrated in Fig. 35. It is made from a pale pumice; the lip of the cup and the bottom of the lid have been ground to a flat surface. There is a shallow external groove round both pieces suitable to hold a tie of fibres to attach the lid to the cup.

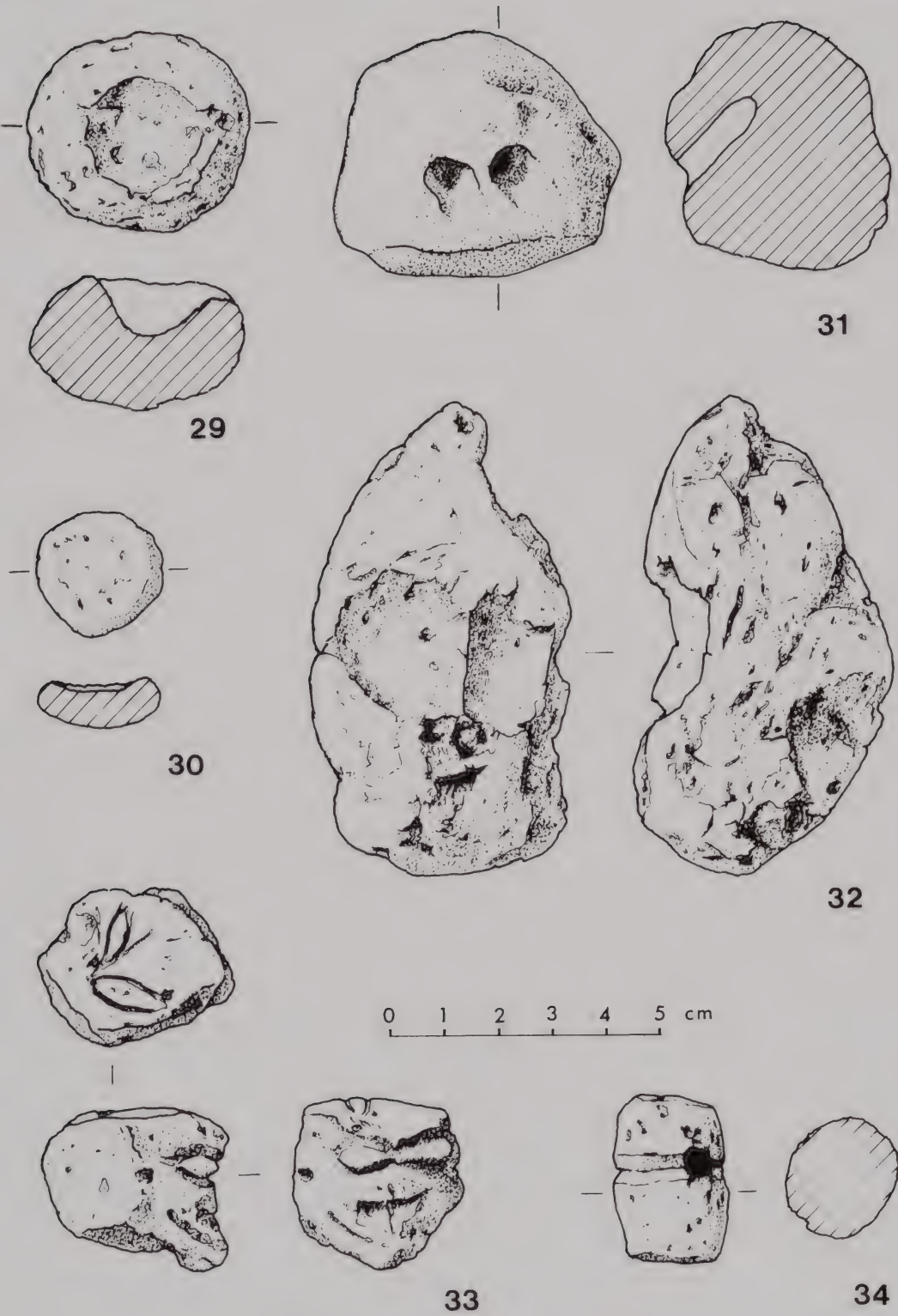
Pumice disc (Fig. 30), slightly hollowed out. A1. South of cook-house. Cat.No. 15.

Rubber (Fig. 31), of local sandstone, flat base, rounded surface, worn by use. Two holes have been drilled at one side, but the wall between them is very thin and has perforated, so the drilling was not finished; probably it was intended to make a sinker. There are two grooves on the opposite side, showing the stone had been used for sharpening points as well as a rubber or polisher. A6. Pit 10 filling, layer 1. Cat.No. 27.

Pumice head (Fig. 32), crudely carved, with back left rough. The large eye sockets are sunk and smoothed, with a thin ridge between them for the nose; the mouth is flawed; the chin and rounded base have been rubbed smooth. A curious piece, probably a trial carving. A2. Pit 2, filling layer 3. Cat.No. 28.

Pumice head (Fig. 33), with incised design on top, which has been ground smooth. Viewed from the side, there is a face with oval protruding eyes below a heavy brow ridge, triangular mouth and jutting chin, all in low relief. It has broken off at the neck. Though the workmanship is crude, this is an effective piece; it is unfortunate that more of it has not survived. A2. Pit 2, filling layer 3. Cat.No. 26.

Cylindrical pumice object (Fig. 34), probably a stopper for a gourd. The surface has been ground smooth and a groove incised around it. A small hole 4 mm in diameter has been started at one side but the drilling was not completed. A2. Pit 2, filling layer 3. Cat.No. 29.



Figs. 29-34. Pumice artefacts from N64/25.



Fig. 35. Pumice cup and lid from dunes, Aotea North Head.

Stone polisher (Fig. 36), of fine grained cream coloured sandstone obtainable locally. The dish-shaped interior has been worn smooth by heavy use and there are shallow transverse grooves and striations made by sharpening points. The centre has been battered by pounding. A2. Pit 2, filling. Cat.No. 32.

Net sinker (Fig. 37), made from a beach pebble of the local basalt; a shallow groove for a suspension cord has been pecked around it but is incomplete. A4. Working place, layer 1. Cat.No. 30.

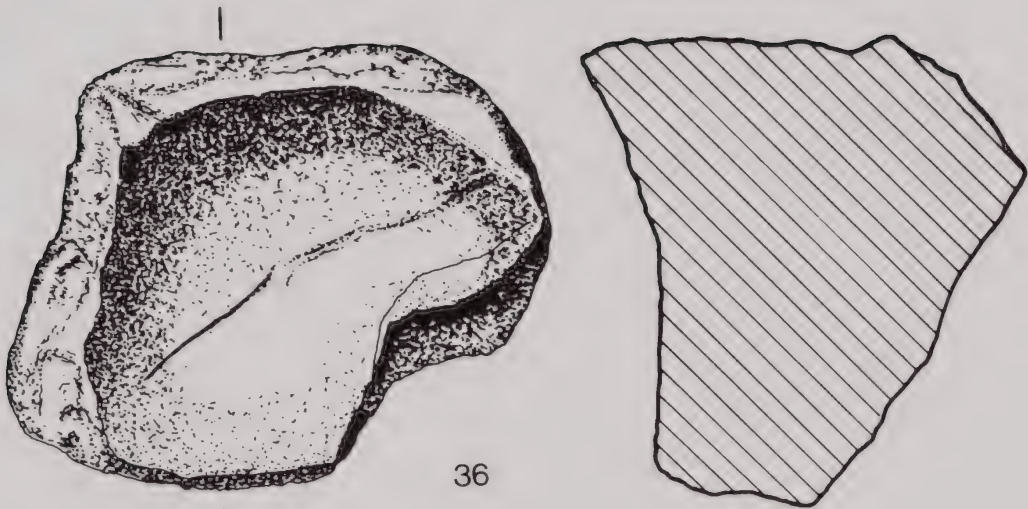
Pumice abrader (Fig. 38), upper surface worn smooth and glossy by polishing. A4. Working place, layer 1. Cat.No. 20.

Greenstone chip. A2, Pit 5, layer 2. Cat.No. 21. Basalt flake 4.5 x 3.5 mm, unused; triangular pointed shape perhaps a trial piece for a drill point. Local material obtainable from near Taranaki Point. A1. Midden around Pit 1. Cat.No. 7.

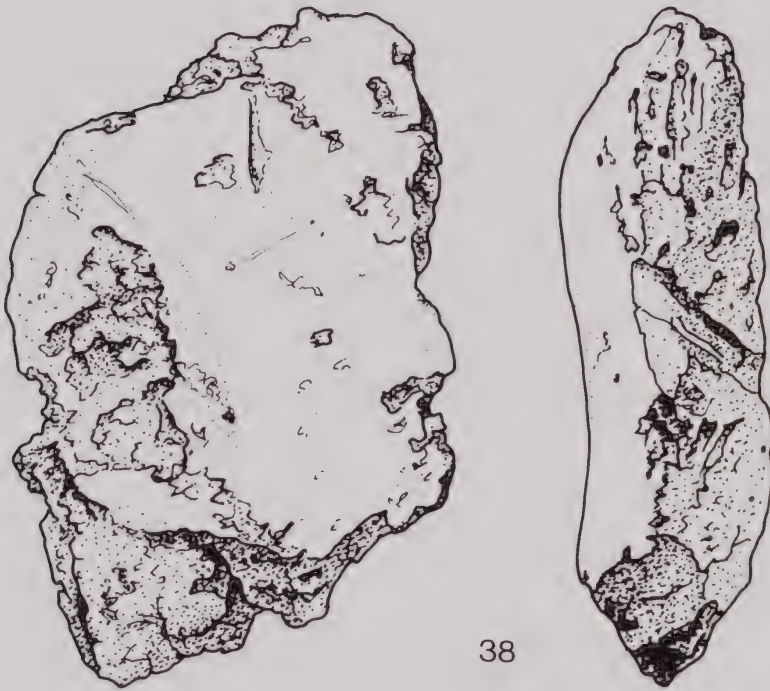
Pebbles of dark red andesite, obtainable locally on the west side of Aotea Harbour or from Pirongia. These were brought to the site probably for use as pounders or hammers. A4. South of House 1, layer 2. Cat.No. 6; A2. Pit 4, layer 2. Cat.No. 22; A4. Working place, layer 2. Cat.No. 31.

SURFACE FINDS FROM KOREROMAIWAHO PA, N64/8 (Figs. 39-46)

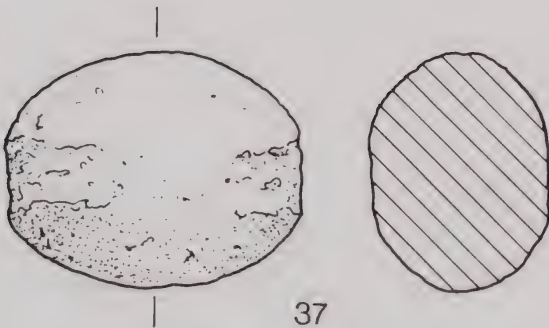
During a visit to study the Aotea sites in September 1982 Fox, in the company of Mr S. Edson of the Waikato Art Museum, Hamilton, visited Koreromaiwaho pa. This small headland pa was on the 61 m (200 ft) crest of the sand dunes *ca.* 100 m south of the Aotea settlement N64/25: successive air photographs recorded its gradual submergence beneath the advancing dunes. It was found that recent westerly gales had swept most of the pa interior clear of sand, exposing the original surface of 3-4 cm thick layer of firm brown loam, with patches of concentrated shell midden and a scatter of artefacts on it. The defences remained sand covered; the ditch was not detectable but the transverse bank had



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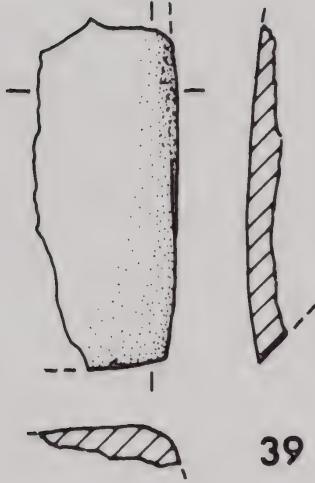
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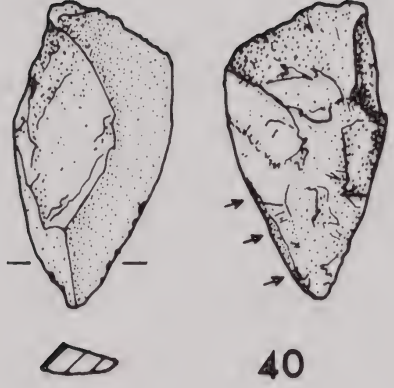
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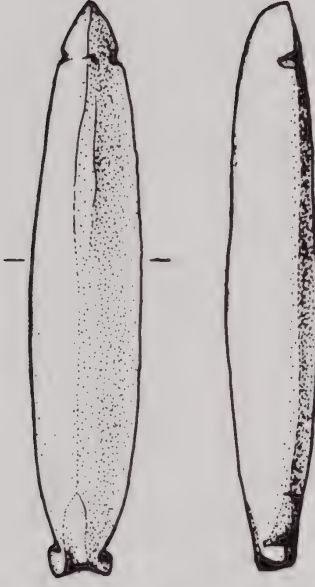
Figs. 36-38. Stone and pumice artefacts from N64/25.



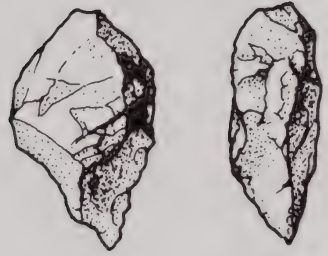
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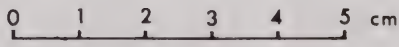
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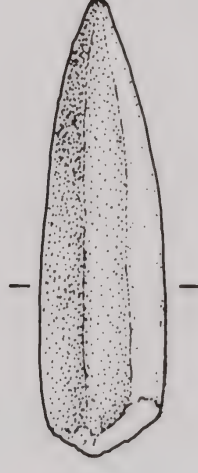
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Figs. 39-46. Artefacts from Koreromaiwaho pa N64/8.

been heightened by blown sand which had lodged against it. There was also a group of rectangular pits which showed up clearly with a pale sand filling surrounded by a rim of brown soil.

The artefacts thus exposed by chance on the interior surface of the pa were found in an area of about 1 x 1.5 m. They were collected officially by Mr S. Edson of the Waikato Art Museum and have been registered in accordance with the provisions of the Antiquities Act. Since they closely resembled others from the excavated open settlement N64/25, they are illustrated in this report as a related contemporary and supplementary group. They are now deposited in the Waikato Art Museum.

Polished adze (Fig. 39), fragment from the blade end. Dr Grant-Mackie identified the stone as a greywacke probably from the Taupiri area of the Waikato. The piece has been used for cutting, shown by the serrated edge.

Polished adze (Fig. 40), thin fragment of blade. Black argillite from D'Urville Island. The piece has been retouched for later use.

Stone trolling lure (Fig. 41), triangular section, minnow type, though lacking eye. It is made from a fine grained sandstone with pale grey surface, from the Kawhia district. At the distal end there is a slight hollow on the upper side to accommodate the bone hook, which was mounted between two lateral knobs and secured by lashings in the notches provided. The head end has similar lateral cuts to secure it to a snood and line.

The type is of early origin and occurs at Wairau Bar (Duff 1977: Fig. 52, No. 188) and at the Washpool site at Palliser Bay (Leach 1979:100, Type A), both datable to the late 12th century. The distribution according to Leach is on both sides of the Cook Strait area, but an extension up the west coast of the North Island to Aotea is now required.

Drill point (Fig. 42), yellow chert of Mesozoic origin, obtainable locally.

Drill point (Fig. 43), of dark reddish brown siliceous sinter of volcanic origin, probably from the Coromandel. Compare Fig. 21 for another example from the N64/25 settlement.

Stone files (Figs. 44-45) of local Tertiary pale grey sandstones: rectangular section showing several faces of use.

Pointed file (Fig. 46), of a dark coarse Jurassic sandstone from the Kawhia area. Compare Fig. 23 for another pointed example from the excavations.

SUMMARY AND DISCUSSION

THE TERRACES AND THEIR FUNCTIONS (A.F.)

The Aotea open settlement is one of the first terraced sites in the North Island that has been systematically excavated. Out of the six to nine groups of terraces that made up the settlement (Fig. 3), four were substantially cleared and it is now possible to discuss their functions and how these were modified during the occupation. This will be done under four headings: housing, storage, cooking and waste disposal, domestic activities and resources.

Housing (Fig. 47)

Two terraces (A4 and A1) had wooden buildings on them, all three built on the firm ground at the back of the terraces. Only one at the west end of A4 fulfilled the usual requirements of a Maori house; this was the smallest of the three (Fig. 47), measuring only 2.25 x 2 m internally, but had a porch 1 m deep. It faced east on to a permanent open space which separated it from a cooking and working place at the opposite end of the terrace (Fig. 10). The house was a curious construction: the ridge pole was supported internally by a row of three uprights, which were decidedly off-centre. In order to have a stable roof of equal weight on either side, the rafters must have extended on the upper side so that their ends rested on the terrace scarp: in effect then, there was no back wall, apart from two subsidiary posts which acted as extra props for the rafters (Fig. 47: reconstructed section). Despite its small size, the house was a permanent construction with some of its posts being replaced when decayed. It was probably inhabited by a person of some importance in the small rural settlement.

The second building at the east end of A4 was a late construction with its postholes cutting into the previous cooking place and rubbish pit 7 (Fig. 10). It was a much larger building measuring 4.4 x 2.5 m internally, with a ridge pole slightly off centre. No details of its internal arrangements were obtained and its function is uncertain. It may be suggested that it was a sleeping house for women and others to supplement the small space available in House 1 at the west end of the terrace (A.F.), or it could represent a series of drying racks (R.C.).

The building on terrace A1 was probably an open-fronted cooking shed; it was also a secondary construction with postholes cutting into *hangi* of a previous open-air cooking place (Fig. 4). It seems likely to have been a lean-to construction open to the south, with the sloping roof supported on a horizontal timber carried on substantial uprights at each end, and with wide eaves projecting forwards. One side wall was lightly built, utilising small timbers and stakes, probably interwoven with raupo (Fig. 47). Some *hangi* cooking was carried on inside and midden continued to accumulate. It could have served as a shelter at meal times and the women, children and possibly slaves, may have slept in it as well. A rather similar feature was found at Maioiro, South Auckland (Fox and Green 1982:68, House 2, Fig. 11) (A.F.).

Storage

The two largest terraces (A2 and A6) were pit stores (Figs. 8 and 12), and surface indications suggest that the same applies to another terrace at the bottom of the slope west of A2 (Fig. 3). It can be presumed that the majority of pits were for winter storage of kumara from crops grown on the valley floor and its north facing slopes, on soils improved by sand quarried from 'borrow pits' nearby (Fig. 15) as previously described. With the exception of an irregular pit cut in the sandstone (Pit 10, Figs. 12-13), and one possible bin pit (Pit 13, Fig. 14), the pits on these terraces were all rectangular roofed pits, which had a central row of uprights to support the ridge pole. In the two long narrow pits, Pits 2 and 11, some of the timbers had been replaced in new postholes (Figs. 8 and 12) and the small bin Pit 13 had been partly cut away when Pit 11 was dug (Fig. 14). It seems that the pits were intended for long-term use and nearly all on A6 had filled up gradually by the natural processes of erosion, soil slip and hill-wash after they were abandoned (Figs. 13-14). Similarly on terrace A2 there was a natural accumulation of soil to a depth of 40

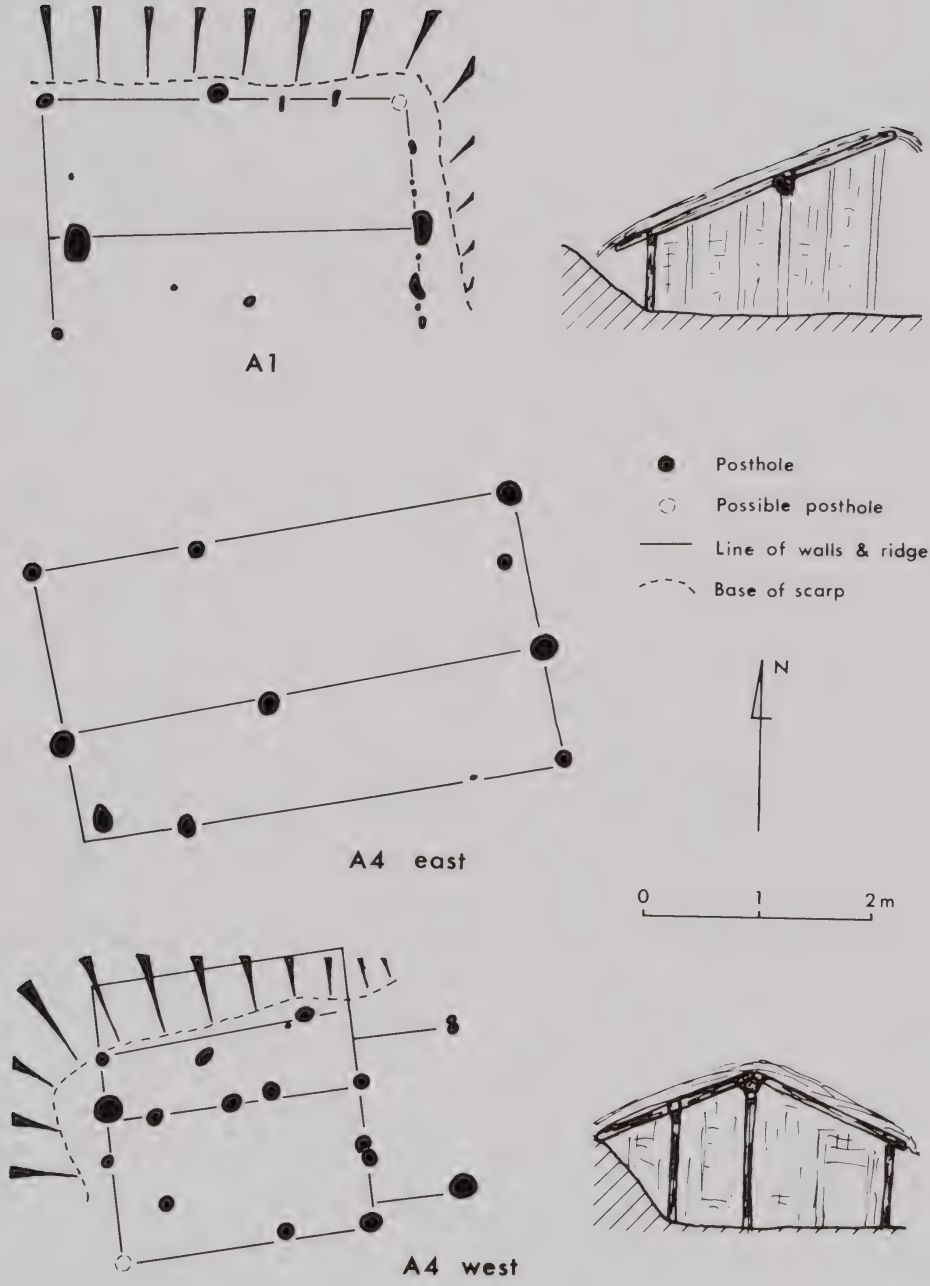


Fig. 47. Reconstruction of timber buildings from the terraces A1 and A4. Drawn by Caroline Phillips.

cm in the pits. There was some secondary occupation in the resulting hollow of Pit 4 where successive hearths and *hangi* had been built for cooking in its shelter (Figs. 7-8), and where some timber slabs were inserted in slots against the pit sides to prevent further slips of loose soil. It can be deduced that the later occupants required less storage space and more room for cooking and food preparation and the disposal of the accompanying rubbish. Pit 5, and two pits on terrace A4 (Pits 7 and 8), were deliberately filled up with *hangi* and midden waste (Figs. 9 and 11) and may have been dug for rubbish pits and not for storage. Two unusual shaped pits with postholes in the angles, Pit 1 on terrace A1 and Pit 6 on terrace A4, may have been used as cool stores, with food suspended in gourds, nets or baskets from an internal timber frame (Figs. 4 and 10).

Cooking and waste disposal

On terraces A1 and A4 a fair amount of space was allocated to cooking. This was done in the usual Polynesian fashion in an earth oven; stones were heated in a shallow circular hollow and the food placed on them wrapped in damp leaves and covered by earth. At the end of the operation, the food would be taken out, the stones removed and the hollow raked out and refurbished for future use. The result was a blackened dish-like hollow which would be deepened a little each time it was used. These are what the excavators found and are shown as '*hangi*' on the plans (Figs. 4 and 10); other similar hollows, marked as 'depressions' showed no obvious burning but may well have been the remains of previous *hangi*.

Originally open-air cooking had taken place in eight or nine *hangi* over the whole of terrace A1, including a succession of three overlying and cutting into each other on the terrace edge. Pit 1 near by was probably used as a cool store at this time. Later an open-fronted shed (Fig. 47) was set up with the timbers of its rear wall bedded in two of the previous *hangi* (Fig. 4). This would have provided shelter for cooking and eating and also sleeping quarters for the women. Examination of the midden around the *hangi* showed that the principal foods were fish and shellfish, mostly pipi and cockles (Appendix 1), with the discarded shells forming the main ingredient of the waste. Much midden accumulated towards the edge of the terrace, burying some of the *hangi* and the filled Pit 1 (Fig. 6), and also spilling down the slope.

On terrace A4 the original cooking place was placed well away from the small House 1, and consisted of a group of at least five *hangi* (Fig. 10). Some of the six similar sized 'depressions' in the middle of the terrace may also have been used for cooking, perhaps at a later date. Much shell midden accumulated and two small pits (Pits 7 and 8) were dug to dispose of it; however, midden continued to be produced, covering both of the filled pits and spilling down the terrace slopes (Fig. 11). Finally, a rectangular building (House 2, Fig. 10) was erected, superseding the earlier open-air cooking place; the mess would then have been confined to the edge of the terrace. In addition, the half-filled disused Pit 4 on terrace A2 was used for *hangi* cooking as previously described; midden was thrown down the terrace slope (Fig. 7).

Domestic activities and resources

The principal occupations of the people in the settlement were kumara cultivation, harvesting and storing, fishing and shellfish gathering and space would be needed for the preparation and conservation of these foods. Kumara would need to be cleaned and sorted before stacking in the pits, and fish likewise gutted in preparation for drying. Many of the shells in the middens showed that the edges had been used for such scraping or cutting of food (Harsant 1983:149). There are places on the terraces clear of buildings and pits where there are small hollows and random groups of postholes suitable for such activities and termed 'working places' on the plans (Figs. 8 and 10). None of the postholes were large or deep enough to support the permanent high wooden storage racks or *whata* similar to those recorded in the deserted Kahouwera pa in the Bay of Islands (Fox 1976:fig.2) but some of the pairs or short rows of small posts could have been for drying, with the fish strung on lines between them. Semi-circles of other posts suggest small temporary shelters were erected.

It is apparent from the finds that some things were manufactured on the terraces. Obsidian was chipped, 43 flakes being recorded, two with cortex: most were found on terrace A4. A few pieces were retouched (Figs. 18-20). Other tools were sandstone files (Figs. 22-23), a scraper of imported sinter (Fig. 21), sandstone polishers (Figs. 31 and 36) and many pieces of pumice abraders, some with glossy polished surface as Fig. 38. Andesite pebbles were used as hammers. Drills had been used to make holes in a sandstone rubber (Fig. 31), and possibly in pipi shells (Figs. 27-28): drill points of chert and sinter were found at the nearby Kororomaiwaho pa (Figs. 42-43). There was no evidence of adze manufacture for which suitable stone was lacking. The pointed file (Fig. 23) and the sharpening grooves for points on the sandstone polishers (Figs. 31 and 36) indicate that the bone fishhooks could have been made on the site. Pumice was used to make a stopper for a gourd (Fig. 34), a cup (Fig. 29), and for crude carvings of a head and face (Figs. 32-33), probably only trial pieces which were discarded.

Most of the raw materials for manufacture were obtained locally; the andesite pebbles and pumice from the ocean beach, the basalt, used for *hangi* stones, from Taranaki Point, and chert and sandstone from the Tertiary formations inland from Manuaitu. Some fine-grained sandstone came from the Jurassic formations near Kawhia. Other substances came from long distances: siliceous sinter of volcanic origin probably was obtained from the Coromandel rather than inland Waikato, according to Dr Grant-Mackie. Analysis of the obsidian by A. Seelenfreund at Otago University showed that half of the pieces (26) originated from Mayor Island; the source of the rest could not be identified. This could be a technical problem or may reflect another source as yet unlocated.

The broken adze (Fig. 17) was made of grey-veined metasomatised argillite from D'Urville Island, as was the fragment of another (Fig. 40) of black argillite from Kororomaiwaho pa; both were probably imported as finished tools.

DATING AND TRADITIONAL HISTORY OF THE SETTLEMENT (R.C.)

The three corrected radiocarbon dates obtained from middens of the second phase on terrace A4 ranged from 440 to 390 B.P. (A.D. 1510-1560 \pm 50 years), and another of 420 B.P. (A.D. 1530) obtained from shells in a borrow pit nearby (Figs. 15-16, Pit e), is

of the same period (see Appendix 3). There were no signs that the occupation was prolonged, and it probably was limited to the first half of the 16th century and certainly to within the overall time span of A.D. 1460-1610 indicated by the radiocarbon analyses.

According to the traditions, as summarised by Smith (1910) and Kelly (1949), the main events affecting the north side of Aotea Harbour were:

1. The arrival of the Aotea canoe, led by Turi, and the subsequent departure of these people on their southward migration that finally ended at Patea.
2. The settlement of Raglan, Aotea and Kawhia by people from the Tainui canoe perhaps *ca.* A.D. 1350.
3. Whatihua, a chief from Kawhia, settled at Manuaitu, perhaps around A.D. 1500.
4. Several north Aotea settlements were attacked and captured by Karewarewa, perhaps *ca.* A.D. 1625 following a series of disputes. The captured settlements include Manuaitu and Kororomaiwaho, the two pa closest to the excavated site.
5. *Circa* A.D. 1700 Kawharu, also from Kawhia, occupied Manuaitu and the other north Aotea sites.
6. Between 1800-1820, a series of battles between various Waikato groups on the one hand, and Ngati Toa and their allies on the other hand (who included Ngati Koata from Aotea) ended in the displacement of the latter. After the departure of Ngati Koata from Aotea the dominant tribes on the northern sides of Aotea Harbour seem to be Ngati Mahanga and Ngati Mahuta of Waikato origin.

The radiocarbon dates from the terraced settlement and a borrow pit, together with the evidence of the artefacts from Kororomaiwaho, suggest that these sites belong to the period following the arrival of Whatihua at Manuaitu, and preceding the defeats of the '1625 A.D.' episode. Although in view of the radiocarbon dates, the later periods are not strictly relevant to this report, it is interesting to note that two of the pa mentioned in the 1800-1820 wars, Ruapuke and Manuaitu, show evidence of lateral ring-ditches being added at a late stage which could plausibly be consigned to this period. Virtually all the sites in the Aotea district named in the traditional histories have been located and the names entered on the N.Z.A.A. site record forms, held at the Waikato Museum.

THE CHARACTER OF THE SETTLEMENT

It is difficult to decide whether the terraces were permanently occupied. There can be no doubt that they would have been inhabited for the autumn harvesting and spring planting season. The question of winter occupation hinges on two alternatives; either the people spent the winter on the terrace sites, where the pits provided most of their winter food, or they lived in the nearby pa Kororomaiwaho, and visited the terraces to collect the stored food when they wanted it. At present the latter alternative seems less likely.

The evidence for mid-summer occupation is not strong: the quantities of shellfish present are very small when the requirements of a family are considered (see App. 1). It seems likely that the shell middens which are so prominent a feature of the sand dunes

near the harbour entrance (see Fig. 2, and Cassels 1973) may be the remains of summer fishing and shellfish gathering camps. On balance, therefore, it seems most likely that the terrace settlements were occupied for most of the year except for periods of the summer when the inhabitants were fishing and shellfishing closer to the harbour. The arrangement of a small house fronting on to a permanent open space on terrace A4 (Fig. 10), strengthens the argument against a casual or temporary occupation. It is not possible to tell if all the terraces were occupied simultaneously, but both authors incline to the view that this was the case.

It is envisaged that each family would possess (for a near permanent occupation), a sleeping house, a cooking shed, work areas and storage pits. On this assumption only on terrace A4 were all these elements identified in close proximity: (the three adjoining storage pits (see Fig. 3) although not excavated, are in little doubt). On A1-A2 the sleeping house was not found but all other components were present. On A6 only the pits were found; presumably therefore the missing components (sleeping house, cooking area, etc.) were located nearby on flatter ground.

Finally, the excavations have shed a new light on the differing functions of terraces in undefended contexts; few of these would have been apparent from a surface inspection. In particular the identification of a house on A4 facing east on to a permanent open space and separated from the cooking area signifies unequivocally the presence of a sleeping house, and the senior status of its occupant in this small community.

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APPENDIX 1

N64/25. Economic analysis of terraces A1 and A2 (R.C.)

There was about 3.2m³ of midden in the A1 excavation area; of this about .5m³ was taken as samples. Most of the samples were analysed. Shellfish species were identified as follows.

		<i>% by weight</i>
<i>Paphies australis</i> (pipi)	52,448 g	90.36%
<i>Chione stutchburyi</i> (cockle)	4,792 g	8.26%
<i>Paphies subtriangulata</i> (tuatua)	202 g	0.35%
<i>Perna canaliculus</i> (green mussel)	90 g	0.16%
other species	510 g	0.88%

The 'other species' category was analysed in detail by Therese Randall, based on one sample. In this sample the following results were obtained (not counting the four most common species listed above). The analysis counted the minimum number of individuals ($n = 243$).

	<i>Min. no of individuals</i>	<i>% of total no</i>
<i>Amphibola crenata</i>	46	18.9%
<i>Cominella adspersa</i>	42	17.3%
<i>Turbo smaragdus</i>	41	16.9%
<i>Elminius modestus</i>	25	10.3%
<i>Epopella plicata</i>	20	8.2%
<i>Maoricolpus roseus</i>	13	5.35%
<i>Diloma subrostrata</i>	12	4.9%
<i>Cominella glandiformis</i>	11	4.5%
<i>Ostrea lutaria</i>	6	2.5%
<i>Xenostrobus pulex</i>	4	1.65%
<i>Mactra ovata</i>	4	1.65%
<i>Lepsiella scobina</i>	3	1.2%
<i>Balanus amphitrite</i>	3	1.2%
<i>Micrelenchus caelatus</i>	2	0.8%
<i>Buccinum linea</i>	2	0.8%
<i>Venerupis largillierti</i>	1	0.4%
<i>Micrelenchus sanguineus</i>	1	0.4%
<i>Amalda australis</i>	1	0.4%
<i>Zeacumantus subcarinatus</i>	1	0.4%
<i>Diloma bicanaliculata</i>	1	0.4%
<i>Haustrum haustorium</i>	1	0.4%
<i>Umbonium zelandicum</i>	1	0.4%
<i>Oxychilus cellarius</i>	1	0.4%
<i>Phenacohelix ponsonbyi</i>	1	0.4%

Other species were recorded elsewhere in the midden as rare specimens: *Balanus decorus*, *Chaemisipho columna*, *Chaemisipho brunnea*, *Micrelenchus tenebrosus*, *Zeacumantus lutulentus*, *Thais orbita*.

By a careful analysis of the stratigraphy within the A1 midden, it was possible to assign ten samples to a chronological sequence. The proportion of the four main species was as follows (% by weight):

	<i>Pipi</i>	<i>Cockle</i>	<i>Tuatua</i>	<i>Mussel</i>
Phase 1 (first phase, bottom layer)	92	7.5	0.02	0.41
2	97	3	—	0.2
3	95	5	0.08	0.14
4	91	8	0.22	0.18
5	94	5	0.94	0.13
6	84	16	—	0.06
7	63	37	—	0.06
8	66	34	—	0.14
9	61	38	0.8	0.18
10 (last phase, top layer)	63	37	0.17	0.11

The shellfish gathering thus shows two main phases. In the first phase, pipi is overwhelmingly the most common species gathered. In the later phase the importance of cockle increases markedly.

The importance of pipi in the site is here expressed in terms of weight of shell. If the analysis had been by minimum numbers, pipi would be about 80% of the total.

A study of barnacles in the midden by Dr Brian Foster of Auckland University, showed that at least one species of barnacle, *Epopella plicata*, must have been gathered deliberately as food, rather than being accidentally incorporated in the midden. He also suggested (pers. comm.) that the presence of remains of *Balanus decorous* indicated winter gathering of shellfish.

A study by Julie Stretton (1974), of breakage patterns of gastropods in the midden, suggested that *Thais orbita*, *Cominella adspersa*, *Cominella glandiformis*, *Turbo smaragdus* and *Amphibola crenata* were intentionally gathered for food and eaten without cooking.

The food value represented by the shellfish on the site was estimated to be about 182,000 calories. If the average person required 1500 calories a day from shellfish, those shells would represent 121 person/days of food. If the site was occupied by a nuclear family of six people, this would last them 20 days.

The following minimum number of animals was identified:

Rats	20 individuals	(mostly <i>Rattus exulans</i>)
Birds	4 "	
Snapper	10 "	(<i>Chrysophrys auratus</i>)
Kahawai	1 "	(<i>Ariippis trutta</i>)
Eel	1 "	(<i>Anguilla</i> spp.)
Dogfish	2 "	
unidentified small fish		
Crabs	4	

The amount of food represented by the midden can be compared to the amount of food that could be stored in the storage pits, using the formula mentioned in Law & Green 1972.

The total storage capacity of all the pits in A1 and A2 was estimated to be 21.86 m³. If 1 m³ stores 130 person/days of food, this would last a family of six for 474 days, that is about one and a quarter years.

If we postulate that the site was occupied twice, and new complete pits were dug on the second occasion of the same volume as before, the midden would then represent 10 days of food for a family; and the pits 237 days, or approximately eight months.

The storage capacity of the pits on A6 was estimated as follows:

Pit 14 =	2.184 m ³
Pit 12 =	3.094 m ³
Pit 10 =	2.0 m ³
Pit 11 =	7.56 m ³
	14.838 m ³

This compares with the 22 m³ estimated for the A1 and A2 pits.

APPENDIX 2
N64/25. Midden analysis of terrace A4 (R.C.)

Mollusc species were identified from one set of samples from a baulk where it was possible to place seven samples in chronological sequence.

In this set of samples (Table 1), cockle is overwhelmingly the dominant species, in contrast to the A1 midden. There is no major change in consumption patterns through time. In some other parts of the midden pipi were more common than cockles, but this was not very frequent.

Bones found in the A4 midden include the following: a dog tooth; at least 29 individual rats (of which four are notably larger than the rest, and may be European rats); 17 snapper, 5 parrot fish (*Pseudolabrus* sp.), 1 moki (*Cheilodactylus* spp.) and several dogfish.

Table 1. Shellfish species at Aotea A4 midden.

	Levels							Total	% of Total
	1	2	3	4	5	6	7		
<i>Chione stutchburyi</i>	279	1612	489	547	284	404	153	3768	66.9
<i>Paphies australis</i>	38	227	28	58	50	72	282	755	13.41
<i>Perna canaliculus</i>	5	16	10	115	353	82	26	607	10.78
<i>Paphies subtriangulata</i>	13	42		18	9	27	4	113	2.01
<i>Cominella glandiformis</i>	3	45	26	15	11	6	3	109	1.94
<i>Elminius placatus</i>		2	8		3	10	3	26	
<i>Diloma subrostrata</i>	1	25	7	8	3	1	3	48	
<i>Dosinia anus</i>	4					6	68	78	
<i>Turbo smaragdus</i>	3	4	3	3	8	1	1	23	
<i>Melarhaphé oliveri</i>	2				2	1		5	
<i>Cominella adspersa</i>	1	6	3	4	1	2	2	19	
<i>Thais orbita</i>	2		2	2	1	6	1	14	
<i>Amphibola crenata</i>						6	4	10	
<i>Lepsiella scobina</i>						5		5	
<i>Venerupis largillierti</i>	2		2		2			6	
<i>Zeacumantus lutulentus</i>	2		3		1	4		10	
<i>Ostrea lutaria</i>		8						8	
<i>Xenostrobus pulex</i>					2		1	3	
<i>Cryptoconchus porosus</i>			1					1	
<i>Cellana radians</i>					2			2	
<i>Protothaca crassicosta</i>					1	1		2	
<i>Maoricolpus roseus</i>							3	3	
<i>Xymene ambiguus</i>						3		3	
<i>Micrelenchus dilatatus</i>							2	2	
<i>Maoricrypta monoxlya</i>							1	1	
<i>Evechinus chloroticus</i>			2					2	
<i>Crassostrea glomerata</i>		1						1	
<i>Monodilepas monilefera</i>							1	1	
<i>Chaemisipho columno</i>		1						1	
<i>Melagraphia aethiops</i>				1				1	
<i>Zeacolpus pagoda</i>					1			1	
<i>Haliotis iris</i>							1	1	
<i>Xymene plebeius</i>							1	1	
<i>Mactra ovata</i>							1	1	
<i>Diloma atrovirens</i>					1			1	
Total for levels	355	1989	584	772	735	640	558	5632	

APPENDIX 3
N64/25 and N64/191. C14 dates

Three samples were submitted from the A4 terrace. Although they came from different layers within the site, there is no reason to think they were more than a few years apart in age. Results received from the Radiocarbon Dating Laboratory, Institute of Nuclear Science, N.Z.D.S.I.R., were as follows.

Sample 1. Pipi (*Paphies australis*) shells from A4/E7/lens V1, in the midden deposit. NZ 1923 A 420 ± 50 B.P.
1923 B 430 ± 50 B.P.

Sample 2. Cockle (*Chione stutchburyi*) shells from A4/F7 layer 2E, in the midden deposit. NZ 1924 A 380 ± 50 B.P.
1924 B 390 ± 50 B.P.

Sample 3. Charcoal from A4/E6/layers 3B and 3C.
NZ 1925 A 410 ± 60 B.P.
1925 B 420 ± 60 B.P.
1925 C 440 ± 40 B.P.

The charcoal in this sample was identified as twigs of *Hebe salicifolia*, *Carmichaelia* spp., *Coprosma* cf. *cunninghamii*, *Leptospermum* spp. and two fragments of unidentified hardwood species.

The C14 date obtained by Walton (see above) from pipi shells (*Paphies australis*) from fill of a borrow pit (N64/191) gave the following result:

NZ 4523 A 410 ± 40 B.P.
4523 B 420 ± 40 B.P.

This date is obviously virtually identical to the dates from the A4 terrace.

APPENDIX 4
N64/25. Charcoal identifications (R.C.)

Charcoals were identified in samples from A1 and A2 by P.R. Smith (MS.). Charcoal was also identified for C14 dating (see Appendix 3).

Of the 117 samples Smith examined, 23 (19%) were rejected because distortion or wood anomalies prevented accurate identification. The overall result of the identifications was:

<i>Hebe</i> spp.	23%
<i>Litsea calicularis</i> (mangeao)	2.5%
<i>Leptospermum ericoides</i> (kanuka)	16%
<i>L. scoparium</i> (manuka)	3.4%
<i>Lophomyrtus bullata</i> (ramarama)	8%
<i>Pseudopanax arboreum</i>	6%
<i>Melicope (ternata?)</i> (wharangi)	2%
<i>Coprosma</i> sp.	7.6%
<i>Dysoxylum spectabile</i> (kohekohe)	3.4%
<i>Olearia (furfuracea?)</i>	4%
<i>Beilschmiedia tawa</i> (tawa)	8.5%
<i>Dacrydium cupressinum</i> (rimu)	2.7%

A charcoal sample was obtained from topsoil near the cliff edge above the west coast, a short distance north of the site. The specimens were identified by B.P.J. Molloy as representing approximately equal quantities of *Metrosideros* sp. (probably pohutukawa) and *Pseudopanax* sp. (*arboreum-colensoi* group).

The main result of the charcoal identifications is to show that by the time N64/25 was occupied, the coastal forest had been removed, presumably by burning, and the landscape was dominated by shrubs. Since occasional trees of coastal forest such as pohutukawa, rewarewa, puriri and karaka still survive in the area today, one must assume that they were not used for firewood in the prehistoric period out of choice.

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